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COST MANAGEMENT COMPETENCIES: THE IMPORTANCE AND FREQUENCY AS SEEN BY THE FINANCIAL ANALYST

THESIS

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THESIS

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Diana E. Pry

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Abstract

This research studied the application of cost management competencies in the financial management career field. The purpose was to determine how frequently these competencies are used by the financial analysts and how important they are in the analysts' work environment. To accomplish this research a mail survey was sent to 978 financial analysts across Air Force Materiel Command. Out of the 978 survey instruments sent, 535 were returned with useful data, for a response rate of 54.7%. From these surveys, 24 of the 49 competencies were identified as being valuable to financial analysts. The 24 competencies provide a framework for future education of the financial analysts. Additionally, 19 of the 24 competencies require education to the comprehension level of learning. Only five of the 24 most valuable competencies required achievement of an application level of learning. This result may provide insight for course directors faced with the challenge of appropriately structuring cost analysis courses.

COST MANAGEMENT COMPETENCIES:

THE IMPORTANCE AND FREQUENCY AS SEEN BY THE FINANCIAL ANALYST

I. Introduction

Background

The effective management of cost in defense acquisition has proven to be a daunting challenge. Each year the Department of Defense (DoD) implements over 15 million contracts and spends approximately $300 billion (Gansler, 1989:4). Additionally, the average cost overrun on a weapon system has been 40% (Gansler, 1989:4). In a defense world characterized by increasing costs and frequent cost overruns, the acquisition corps needs to ensure that cost estimates are accurate. Historically, the armed forces have provided optimistic figures for the cost of weapon systems when requesting funds (Gansler, 1989:6). In addition to accurate cost estimates, we need financial analysts who possess the proper tools and cost management skills to perform the daily functions needed to avoid these cost overruns. In these days of higher public scrutiny and concern, all acquisition personnel in the program offices, laboratories and logistics centers need to continue improving our financial capabilities to effectively serve the public.

Problem Statement

Over the past years, the Department of Defense has seen a reoccurrence of programmatic problems within its major acquisition programs (i.e., the A-12, C-17, and F-22) (Morrison, 1991:30; Boatman, 1992:1014; Boatman, 1993:12). These problems include cost overruns and schedule slippages, two areas which are highly correlated (Morrison, 1991:30; Boatman, 1992:1014; Boatman, 1993:12). As Gansler says in his book, *Affording Defense*, "Cost growth and schedule stretchout are interrelated and reinforce each other. As increasing costs confront a fixed or decreasing budget, the only way to 'fit' the higher costs into the budget is to stretch out the program, by extending its development time and/or by buying fewer production units each year." (Gansler, 1989:121). Cost overruns cannot be attributed to any one functional area, but are compounded by a multitude of forces working together. Studies by both the Air Force Systems Command in 1983 and the Army in 1985 found three major sources of instability which contribute to cost overruns. These sources include:

1. Annual or more frequent departures from the expected or planned level in the top line of the DoD's or the service's budget,
2. Externally generated changes in an individual program's budget, quantities, and/or technical requirements, and
3. Changes generated from within the program (possibly from low initial cost estimates or technical problems with no contingency funds).

The above sources of instability cause cost increases that cannot be covered by the authorized budget for the program (Gansler, 1989:122). These sources lead to higher unit costs, longer schedules, and cost overruns. Possible solutions to

this instability need to be studied in order for the acquisition of weapons systems to continue without such costly repercussions.

In some respects, financial analysts have contributed to problems related to the management of costs in DoD acquisition programs. One problem is that many DoD financial analysts lack the proper training to perform complete and accurate cost estimates. This leads to a major problem facing the acquisition community, "How do we ensure the accuracy of cost estimates?" To ensure these estimates are accurate, the acquisition corps must be properly trained and possess the required skills to perform its duties. The question now becomes, "What type of training and what skills are required for financial analysts to be able to accurately perform cost functions within acquisition programs?"

This research identifies the skills needed and used by financial analysts in the field. Based on their responses to a survey, financial analysts within Air Force Materiel Command (AFMC) helped identify the importance and frequency of use of pre-determined cost management competencies. In addition to determining the importance and frequency of use of the competencies, this research also determined if situational factors or training levels affect the financial analysts' perceptions.

Research Questions

1. Which cost management competencies are valuable to financial analysts in the Defense Acquisition work force?
    a. Which cost management competencies are perceived to be most important by financial analysts?

b. Which cost management competencies are reported to be used most frequently by financial analysts?

2. What personal or situational factors influence the perceived value of cost management competencies?

   a. Is there a significant difference between military members and civilians in their perceptions of the importance and frequency of use of various cost management competencies?

   b. Is there a significant difference between the type of financial analyst (budget or cost) and their perceptions of importance and frequency of use?

   c. Does the individual's organization type (SPO, Laboratory, ALC, HQ) have an effect on the frequency of use and importance of cost management competencies?

   d. Does the individual's role in an organization (matrixed, collocated, functional) have an effect on the frequency of use and importance of cost management competencies?

3. Does prior education influence the perceived value of selected cost management competencies?

   a. Does an individual's Professional Continuing Education (PCE) have an effect on the frequency of use and importance of cost management competencies?

   b. Does an individual's graduate management education have an effect on the frequency of use and importance of cost management competencies?

   c. Is there a significant difference between the Acquisition Professional Development Program (APDP) levels attained and the frequency of use and importance of cost management competencies?

Scope

This thesis attempts to assist one area that contributes to a program's problems-the financial function. Intertwined in this functional area are budget and cost personnel and even plans and programs personnel; all of whom have

some influence on a program's success. The competencies reviewed will help in identifying who is using the competencies and at what level of the program are specific competencies more valuable. In addition, this thesis focuses on those analysts within AFMC due to their work with the acquisition programs of interest.

Summary

Education and training has become a vital part of the efforts to develop the defense acquisition workforce. This education and training not only controls the jobs individuals are able to attain, but also influences how these jobs are performed. This research identifies competencies needed by financial analysts to aid them in performing accurate and complete cost management functions in an effort to provide good "foundations" for acquisition programs.

Chapter 2 shows the changes in philosophy for education and training by using competency-based education (CBE) models for future programs. Chapter 3 explains Baxter and Bolin's survey instrument, the sampling approach, survey distribution, and basic survey results. Chapter 4 presents the findings and results of the survey instruments. Chapter 5 concludes this effort with remarks and recommendations for follow-on efforts.

II. Literature Review

Overview

This chapter provides in-depth research into the area of competency-based education. Since this research effort investigates the competencies required by financial analysts, it is necessary to define exactly what a competency is and how these competencies are used to develop education programs. The area of competency-based instruction can involve both training and education. For the purpose of this research, the focus will be on the educational aspects of the competency-based approach. Additionally, this section presents reasons behind the movement towards competency-based education, not only by the government, but also within the commercial sector. Finally, this chapter examines the cost management competencies deemed important by the DoD functional boards and how these competencies are being incorporated in today's education programs.

Competency-Based Education

Before discussing competency-based education, it is necessary to define a competency. Two definitions follow:

> Worthy accomplishments that make the employee valuable to the employer and that make the employer valuable to the customer. (Blank, 1982:58)

> The knowledge skills and abilities which are required in order to perform a job effectively. (Hawkins, 1993:6-7)

A program could then be considered a competency-based education program if it contained:

1. Competencies which were specified in behavioral terms.
2. Assessment devices which were related to and measured the specified competencies.
3. Instructional modules of teaching/learning units which were designed to achieve the specified performances.
4. Graduation based on mastery of competencies. (Hawkins, Misc briefing slides)

Based on the above list, competency-based education programs rely on mastery of specified competencies for successful program completion. The concept of “mastery” is very different from traditional educational programs. Research done by William Blank studies competency-based programs and their differences from traditional programs. Throughout his work, Blank focused on the idea of competency-based training, but these concepts also relate to competency-based education. The following table shows four major differences between competency-based programs and traditional programs (Blank, 1982:5).

Table 1. Competency-Based vs. Traditional Programs

Characteristic	Competency-Based Programs	Traditional Programs
WHAT Students Learn	1. Are based solely on specific, precisely stated competencies that have been verified as being essential for successful employment in the occupation for which the student is being trained. These competencies are made available to all concerned and describe exactly what the student will be able to do upon completing the training program.	1. Are usually based on textbooks, reference material, course outlines or other sources removed from the occupation itself. Students rarely know exactly what they will learn in each successive part of the program. The program is usually built around chapters, units, blocks, and other segments that have little meaning within the occupation-instructors focus on "covering material".
HOW Students Learn	2. Provide trainees with high quality, carefully designed, student-centered learning activities, media and materials designed to help them master each task. Materials are organized so that each individual trainee can stop, slow down, speed up or repeat instruction as needed to learn effectively. An integral part of this instruction is periodic feedback throughout the learning process with opportunities for trainees to correct their performance as they go.	2. Rely primarily on the instructor to personally deliver most of the instruction through live demonstrations, lectures, discussions and other instructor-centered learning activities. Students have little control over the pace of instruction. Usually, little periodic feedback on progress is given.
WHEN Students Proceed from Task to Task	3. Provide each trainee with enough time (within reason) to fully master one task before being allowed or forced to move onto the next.	3. Usually require a group of students to spend the same amount of time on each unit of instruction. The group then moves on to the next unit after a fixed amount of time which may be too soon or not soon enough for many individual trainees.
IF Students Learned Each Task	4. Require each individual trainee to perform each task to a high level of proficiency in a joblike setting before receiving credit for attaining each task. Performance is compared to a preset, fixed standard.	4. Rely heavily on paper and pencil tests and each student's performance is usually compared to the group norm. Students are allowed (and usually forced) to move on to the next unit after only marginally mastering or even "failing" the current unit.

(Blank, 1982:5)

This table shows specific areas where differences occur in the two types of education programs (Blank, 1982:5). As can be seen from above, there are major differences in the approach to learning in competency-based programs. Traditional programs tend to use broader educational tools, i.e., textbooks,

outlines, etc., to try to cover all the material possible; whereas, competency-based programs focus on specific, pre-determined competencies that have been deemed necessary for success in a particular job. Additionally, competency-based programs emphasize working at an individual's own pace to fully grasp needed concepts, and completion is based on understanding and mastery, not traditional textbook exams. To many in the education field, these ideas may seem out of the ordinary, but the concepts are being used more and more often as the need for understanding and comprehension overcomes the need for explaining and moving on to new topics.

Many people believe that competency-based education is a new phenomenon, but looking back in history it has actually been around for many years. An example shown by William E. Blank in his book *Handbook for Developing Competency-Based Training Programs*, compares CBE as seen today with that of the apprentice-master concept. When an apprentice was going to learn a new task, this task was explained and then shown to the apprentice by the master craftsman. The apprentice then performed this task and presented the completed task to the master craftsman. If the work passed inspection, the apprentice would continue performing this task until it was perfected. Only after perfecting this task would the apprentice learn something new. This apprentice-master concept is becoming more accepted in many areas of education including vocational studies and, as will be seen later, DoD education programs.

As the movement towards CBE increases, the question becomes “why did CBE not start sooner”. As mentioned, this method has been around for many years, but it is now receiving more emphasis. The Acquisition Enhancement (ACE) Program Report gave five possible reasons for the use of CBE. These reasons include:

1. Policy demands (where clear outcome signals are given).
2. Competency-based education is learner-centered.
3. Competency-based education is real-life oriented.
4. Competency-based education places less emphasis on time.
5. A competency-based education places expected outcomes/statements “up front” as guides for both instructors and learners.

A similar report by the Phi Delta Kappa Educational Foundation gives the following characteristics of competency-based education:

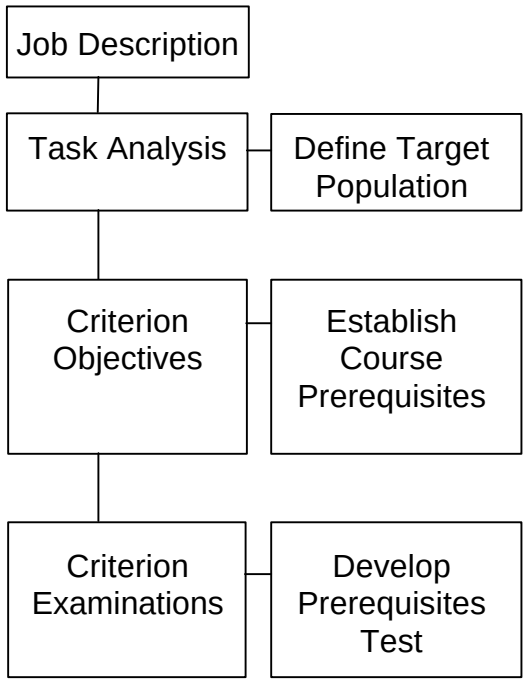
1. It is a learner-centered philosophy.
2. It is a policy demand.
3. It is real-life oriented.
4. It is flexible.
5. Its standards are clearly articulated.

As Dr. Bob Hawkins from the Navy Acquisition Management Training Office writes, “At its root, competency-based education is an emphasis on results.” (Hawkins, 1993:10). This emphasis on results has caused the educators to put more credibility in competency-based programs.

To develop a competency-based program, a three-phased plan is recommended by Dr. Hawkins. These phases, the preparation phase, the

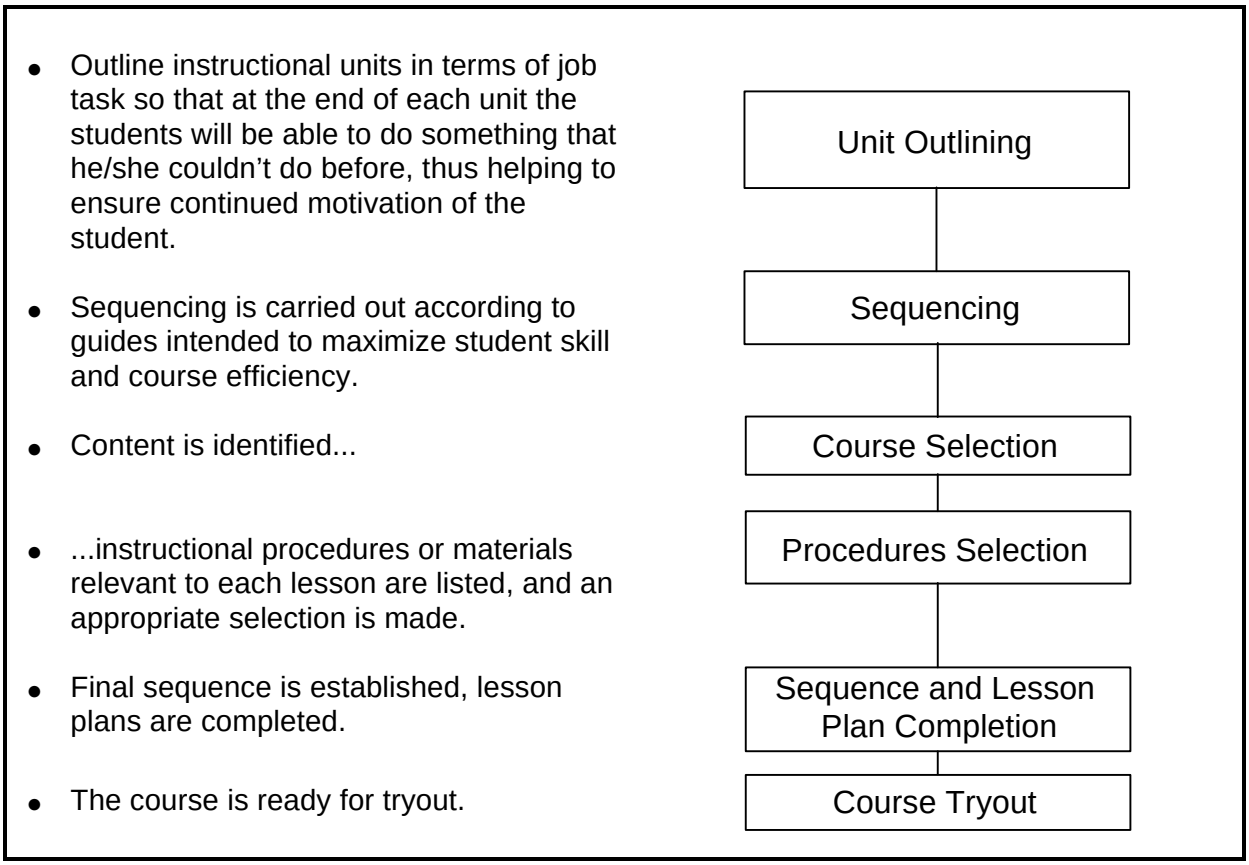
development phase, and the improvement phase show the paths from program beginning to program follow-up. The following three figures show the three different phases and the steps involved. Figure 1 represents the Preparation Phase. During this phase, the organizers identify the job descriptions and refine these descriptions until the job can be broken down into specific tasks. Additionally, this phase provides the place for objectives to be determined and for exams to be developed to meet the course objectives. The Development Phase, shown in Figure 2, organizes the material to allow for development of a pilot course. This phase selects the material required and sequences the material to help in preparing the courses' lesson plan. Once the lesson plan is complete the course is ready for "course tryout" The Improvement Phase, shown in Figure 3, is the last phase of this plan. During the improvement phase, the instructors compare the performance results with the desired objectives for the course and for the participants job requirements. If revision is needed, it will occur during this phase, and the course will again be ready for additional tryouts. The improvement phase is a continuing loop to ensure that the course always meets its desired objectives.

- General description of what one does when performing a job.
- Description of job analysis in finer detail, listing each of the tasks of which the job is composed and describing the steps in each task.
- Objectives are derived primarily from tasks analysis information; they are adjusted on the basis of course prerequisites and administrative constraints.
- Preparing measuring instruments to measure success. The criterion exam is developed strictly from the course objectives, and the prerequisite test is developed strictly from the course prerequisites.



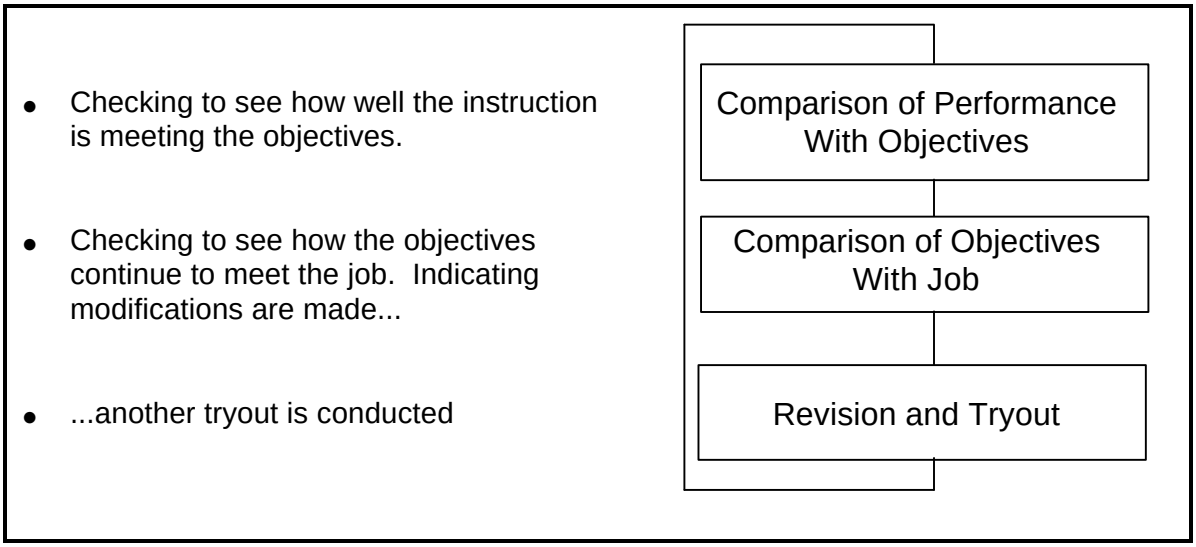
(Hawkins, Misc Briefing Slides)

Figure 1. The Preparation Phase



(Hawkins, Misc Briefing Slides)

Figure 2. The Development Phase



(Hawkins, Misc Briefing Slides)

Figure 3. The Improvement Phase

Following these three phases provides a solid foundation for a CBE program (Hawkins, Misc Briefing Slides). Competency-based education programs may not be perfect in their education approaches, but as Blank states, “The competency-based approach will not cure all problems we face in training individuals for employment, but it will help.” (Blank, 1982:10).

Competency-Based Education as an Educational Tool

The above findings compare competency-based programs with traditional programs, in addition to providing the phases needed in setting up a competency-based program. This literature review will now study how CBE is being used in a variety of educational areas.

The competency-based education movement received attention in the 1980’s for teaching adult education. The teaching emphasized language courses to refugees entering the United States. The goals of these CBE courses were to provide entry level skills to the refugees and teach English proficiency to enable these refugees to get employment. To apply CBE to the educational environment, it is thought of as four step cyclical process (Savage, 1993:556):

1. Assessment of student needs.
2. Select competencies based on those needs.
3. Instruction targeted to those competencies.
4. Evaluation of student performance in those competencies.

This process allows for a broad range of competencies in the educational curriculum. One problem facing CBE within the educational realm is that

“Advocates of the competency movement complain that they are required to demonstrate the validity and value of competence based learning, whereas academic validity is taken for granted” (Johnston and Sampson, 1993:217). Support for CBE is further provided by the belief that reality is constructed from experiences, and that a higher degree of learning is used from conceptual knowledge rather than just language. Finally, CBE emphasizes demonstrations and uses of knowledge. (Dunn, 1994:83). These demonstrations and uses of knowledge involved in competency-based education enhance the educational process to provide the student with a solid foundation in which to follow.

In the past few years competency-based education has been influenced by the National Council for Vocational Qualifications (NCVQ) (Hyland, 1994:327). The NCVQ’s original emphasis was to use CBE in vocational education and training. There is now a shift towards using the same CBE approaches for higher education (Hyland, 1994:328). In order to ensure that this shift moves towards competency-based education, there needs to be well-defined “learning outcomes” that are expressed in terms of pre-determined competence standards for a specific program (Hyland, 1994:327). Additionally, the developers need to ensure that the CBE models are based on expert judgments and reflect common practice in the educational areas where the model is being applied (Hyland, 1994:327). The NCVQ is set on providing programs which are outcome and product-oriented and tend to emphasize “the reduction of learning and experience to statements of competence derived from the functional analysis of occupational work roles” (Hyland, 1994:330).

Competency-Based Education in the Commercial Sector

With increasing value being placed on CBE, it is now seen as an emerging phenomenon in the commercial sector. Many areas of business are adopting the competency-based approach to educate their employees and prepare them for the tasks which they will be expected to perform. Terry Hyland quotes from R. Barnett's article, "The Idea of Higher Education", that there is the "growing clamour from industry for the graduates it employs to have more work related skills" (Hyland, 1994:328). Supporting this movement towards competency-based methodologies in the commercial sector, Reginald Melton states in his 1994 article that "The 1992 standards of competence-in the form of National Vocational Qualifications-had been identified for 80% of the workforce" (Melton, 1994:285). In essence, 80% of the workforce have competency levels which they are expected to achieve.

As the commercial sector searches for employees who possess these task/competency related skills, more and more professions are attempting to accommodate these businesses. Professions which follow the competency-based approach for education include dentistry, nursing, and other health related fields. Competencies are being identified which are necessary for professionals in the health care field (VanFleet, 1994:1). Another career field which has already been mentioned is that of teaching. Not only is CBE being used to teach English proficiency to refugees, it is also being used to teach the teachers. A thesis by University of Pittsburgh student, James Moyer, attempted to "identify entry-level competencies considered necessary by educational

communications and technology faculty and practitioners" (Moyer, 1993:1). The study looked at desired competencies needed by those individuals entering the field. The results showed 57 of 72 competencies studied to be significant to students entering the field of educational communications and technology.

In addition to commercial businesses desiring individuals with task-related experience, these same businesses are adopting a competency-based approach towards interviewing prospective workers. Instead of leading interviewees through the questioning stages, businesses are asking more conclusive questions that deal with "how" related experiences. First implemented by Mobil, Inc., and now used by many of the Fortune 500 companies, this approach allows prospective employers to not only hear the answer from the prospective employee, but also allows the interviewer to begin to visualize "how" the employee accomplished the task (Cameron, 1995:personal interview). As mentioned, competency-based approaches are becoming more widely used in all areas from education, to health care, to Fortune 500 companies. With this wide use and acceptance, it is not surprising that CBE is now moving into the DoD.

DoD Education Programs

The Acquisition Professional Development Program (APDP) was established to provide a formal framework for acquisition professionals to receive education in their functional areas of expertise. The past years have produced many changes with these education programs. The most recent

changes are a result of the Defense Acquisition Workforce Improvement Act (DAWIA). DAWIA attempts to ensure that the DoD acquisition workforce has the necessary skills to perform their jobs. This act redefines the certification process and provides a three-tiered structure for certification. Additionally, DAWIA sets the education and training standards that the Department of Defense must meet. A further result of DAWIA is the Defense Acquisition University (DAU) and the DoD Functional Boards.

The DAU manages the programs and education of all the functional areas within the Department of Defense. Within DAU there are 16 schools that educate and train acquisition personnel in 12 career fields: Program Management; Communications/ Computer Systems; Industrial Property Management; System Planning, Research, Development, and Engineering; Contracting; Purchasing/Procurement; Test and Evaluation Engineering; Quality Assurance; Manufacturing and Production; Acquisition Logistics; and Business, Cost Estimating and Financial Management, and Auditing (Ball, 1993:3).

The DoD Functional Boards were formed in 1992 to help with the implementation of the new certification process and course requirements established by DAWIA. Each career field has its own functional board made up of personnel from the Army, Navy, Air Force, and Marines. Appendix C shows the specific functional board responsibilities for the Financial Management area. As can be seen from this list, the responsibilities seem to follow the three-phased plan of Dr. Hawkins. For example, responsibility 1 addresses "determining the experience, education, training requirements..." which coincides

with Phase 1, the Preparation Phase. Continuing on, responsibility 4 states that they shall "make recommendations on the establishment or disestablishment of mandatory business, cost estimating and financial management courses..." which parallels with Phase 2, the Development Phase. Phase 3, the Improvement Phase, is addressed by responsibilities 7 and 8. The functional board's responsibilities correspond with the three-phased plan, thereby providing the functional board with a solid foundation for its competency-based education program.

Competencies for DoD Cost Analysts

As mentioned earlier, one task of the functional boards was to develop competencies needed by personnel in the Business, Cost Estimating and Financial Management career paths. The functional board identified 76 duties under which multiple tasks were broken out. These duties are considered the competencies that the trainees should master by course completion. After the 76 duties and accompanying tasks were identified, each was ranked using Bloom's taxonomy. Bloom's taxonomy categorizes learning using a six stage taxonomy. The six stages of Bloom's taxonomy can be seen in the following table:

Table 2. Bloom's Taxonomy

Level 1	Knowledge
Level 2	Comprehension
Level 3	Application
Level 4	Analysis
Level 5	Synthesis

(Bloom, 1956:18)

These six stages were used by the functional board to categorize the duties/tasks. The six stages helped in establishing a methodology to match the correct courses to the correct duties/tasks for the various levels of the certification process.

In addition to the competencies identified by the functional board, the Society of Cost Estimating and Analysis (SCEA) has also defined a cost estimating and analysis "body of knowledge". This body of knowledge is made up of cost concepts that are "the elementary ideas about which cost estimating and analysis is concerned." (Society of Cost Estimating and Analysis, 11). The SCEA has established a professional certification program for individuals in the cost estimating and analysis field of study. Although this program is not specifically DoD related, the cost concepts identified closely parallel those competencies identified by the functional board.

A third source of cost competencies was established by Baxter and Bolin for their 1994 thesis. As reference for their survey instrument, they used not only functional board inputs, but also cost competencies established by the Project Management Body of Knowledge (PMBOK).

Appendix D shows the competencies identified by these three sources. Although all possible cost competencies may not be identified, these lists provide a good reference for individuals in the Business, Cost Estimating and Financial Management functional area.

Drawbacks of Competency-Based Education

As with any educational method, there are both positive and negative attributes. Although proponents of CBE can be found in the education arena, there are also opponents to this technique. Reasons cited for their disagreement with the methodology include the belief that CBE tends to place restrictions on learning and it leads to the narrowing of course context (Hyland, 1994:331). There is also the belief that CBE emphasizes knowledge rather than use (Hyland, 1994:331). Additional drawbacks involve the definitions of competence. Many scholars argue that there are a large range of definitions which begin at the very simplistic level and move up the scale to the overly complex (Hyland, 1994:331). Another disagreement addressed is whether a competence is a personal attribute, an act, or an outcome of behavior. Even with the above mentioned drawbacks, the support for competency-based education is still strong and attempts are being made to keep knowledge and understanding on more equal footing (Hyland, 1994:331). Finally, CBE programs "will offer a wide range of competencies, provide task-based activities that encourage performance, and utilize approaches that develop the ability of students to express their own thoughts" (Savage, 1993:557).

Summary

Throughout this literature review, the emphasis has been on competency-based education programs. With DAWIA, greater emphasis has been placed on the proper education of our workforce and to standardize the way this education is accomplished. Dr. Hawkins states:

> The principal outcome of the competency-based education movement may be that acquisition educators and the functional communities they serve will together reexamine what is to be taught and, more importantly, what is to be learned. This type of focus upon the curriculum should result in a greater degree of congruence between the expectations of the students, the various career fields outlined in the Defense Acquisition Workforce Improvement Act (DAWIA) legislation, and the educators. Everyone will have a clearer picture of what the consortium schools are to accomplish. (Hawkins, 1993:11)

This emphasis on identifying the competencies and following through with the correct education should enable our acquisition workforce to be more knowledgeable in the daily operations of business and help avoid many of the past problems.

III. Methodology

Overview

The emphasis of this research was to determine which cost management competencies were being used by the financial analysts within AFMC. In order to accomplish this task, it was necessary to query those financial analysts to determine what competencies they felt were both important and used most often. Due to the large number of financial analysts within AFMC and the follow-on effort involved, a survey was the best instrument for this situation. The survey instrument used was originally distributed to program managers in the 1994 research effort by Capt Brent Baxter and Capt Kurt Bolin. During their study they examined various cost management competencies and how the program manager perceived the importance and frequency of use of the identified competencies. Their focus was to determine if the results could impact the current development and training available for program managers (Baxter and Bolin, 1994).

As with the Baxter and Bolin research effort, this study has also addressed current training available for financial analysts to see if the current program changes are moving in the right direction. Because of the variety of cost management techniques used in different organizations, this research was based on the largest possible sample size within AFMC.

Conducting the Survey

The sample was split into two groups. One group received the portion of the survey that focused on how frequently various competencies are used. The remainder of the sample received the portion of the survey that focused on the importance of competencies. The competencies on the two portions are identical; only the emphasis (frequency vs. importance) is different. The main reason for the survey separation is due to the survey pre-test. During the pre-test conducted by Baxter and Bolin, only one survey was administered. It contained questions relative to both frequency and importance (in other words, both surveys in one). The major comment from the pre-test was that the survey was too long. From this input, the survey was separated into two distinct surveys. The last five questions on each survey instrument are identical to five questions contained on the alternate survey instrument. That is if a participant's survey focuses on frequency of use of cost management competencies, the last five questions emphasize how important the given competencies are. This survey design will enable comparisons to be made between survey groups to ensure both split samples represent the same population.

The survey was mailed out via military pouch and returned the same way. Each participant received a survey, an answer sheet, and a return envelope. The participants were given three weeks for survey completion.

Sampling Approach

Defining the sample is an important step before survey information is sent. In the world of the financial analyst there are many different paths to follow. There are jobs which emphasize budget experience and others that require a cost analyst. In addition to the various paths, job descriptions differ from one organization to another. In order to attain a representative sample it was necessary to survey personnel from all types of organizations and financial backgrounds.

Population. In order to have responses from a variety of organizations and backgrounds, an attempt was made to send the surveys to the largest possible sample size. This sample was taken from AFMC since this research was concerned with cost management competencies associated with acquisition programs. Both the military and civilian personnel lists were obtained through the databases of HQ AFMC/DP. These databases include names and bases of all individuals holding financial analyst positions. The lists obtained from the headquarters were further segregated based on grade. The survey criteria included military financial analysts below the grade of O-6 and civilian financial analysts holding grades GS-9 through GS-14. There were 1122 military and civilian members holding financial analysts positions. This number was reduced to 978 based upon the incomplete data provided by the database and accessibility of the individual through military mail. There were no restrictions placed on individuals because of their certification level or lack thereof. This enabled the results to be compared based on whether or not members had

obtained a specific Acquisition Professional Development Program (APDP) certification.

Target Sample. The surveys were mailed in two different forms. One form emphasized the importance of the given competencies while the other emphasized the frequency with which the competencies were used. One form was sent to each financial analyst from the population. The following table shows the breakout of military to civilian based on survey type:

Table 3. Population of Survey Recipients

	Military	Civilian
Importance	179	310
Frequency	179	310

By having a mixture of both military and civilian personnel, this research hopes to examine similarities and differences between the two groups. In traditional settings the military members tend to change jobs with more frequency than civilians, thus losing the continuity of a particular job. This research will show whether or not the perceived importance and frequency of cost management competencies varies between the military and civilian financial analysts.

Sample. The survey was conducted via mail to the 978 members of the population. The participants were given three weeks to complete the survey. Of the 978 surveys mailed, responses were received by 535 for a total response rate of 54.7%. Additionally, the response rate for the importance and frequency

portions individually were 52.4% and 57.1%, respectively. The following figures characterize the sample based on the demographic questions used to separate the groups for analysis.

Figure 4 shows the percentage of military and civilian responses to the survey. As can be seen, about 65% of the responses to each survey came from the civilian population with the remaining 35% representing the military population.

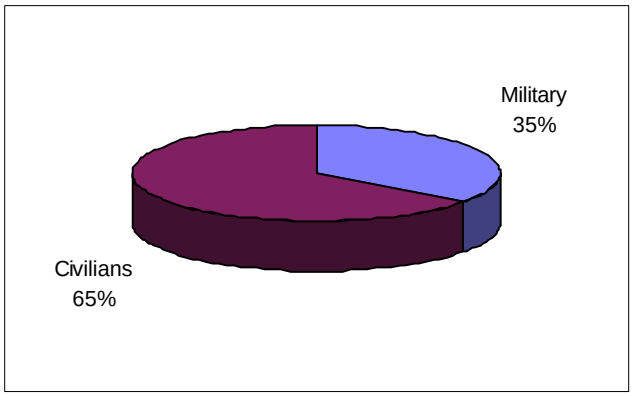


Figure 4. Military and Civilian Respondents

Figures 5-12 present results from the demographic information requested from the respondents. Figure 5 shows the number of respondents who have taken Financial Management Courses such as Professional Military Comptroller Course, Financial Management in Weapon Systems Acquisition and Principles of Cost Analysis, etc. As the figure presents, approximately 83% of the respondents have taken such courses. This information will be referenced later in the research question analysis.

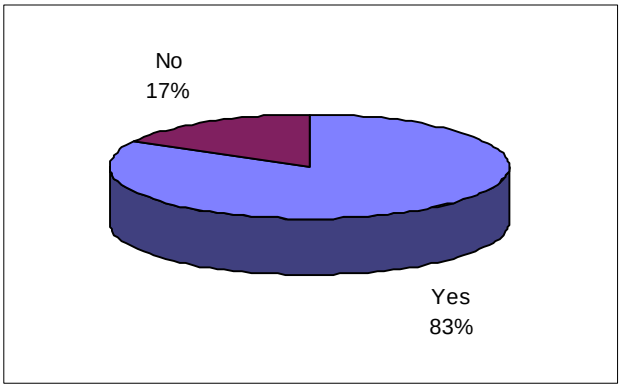


Figure 5. Respondents with Financial Management Courses

Figure 6 represents those respondents with Contractor Performance Measurement Courses. Again, there is a large number of respondents, 69%, who have taken Contractor Performance Measurement Courses.

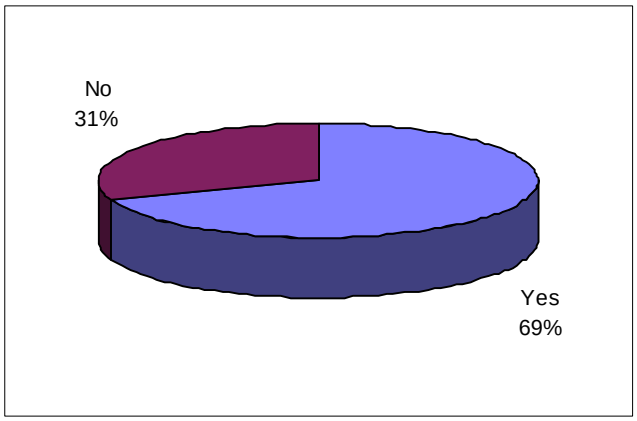


Figure 6. Respondents with Contractor Performance Measurement Courses

The next two figures address those respondents with advanced degrees. Figure 7 shows the number of respondents with AFIT Cost Analysis degrees, while Figure 8 shows those respondents with advanced management degrees. There are very few AFIT Cost Analysis Master's among the respondents, only 7%, but

there are 40% of the respondents who have other advanced management degrees.

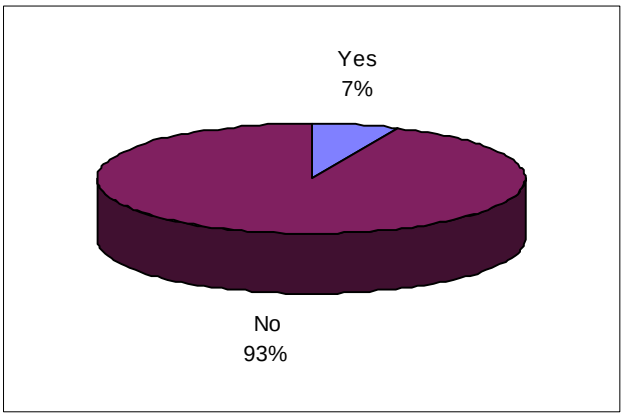


Figure 7. Completion of an AFIT Cost Analysis Master's Degree

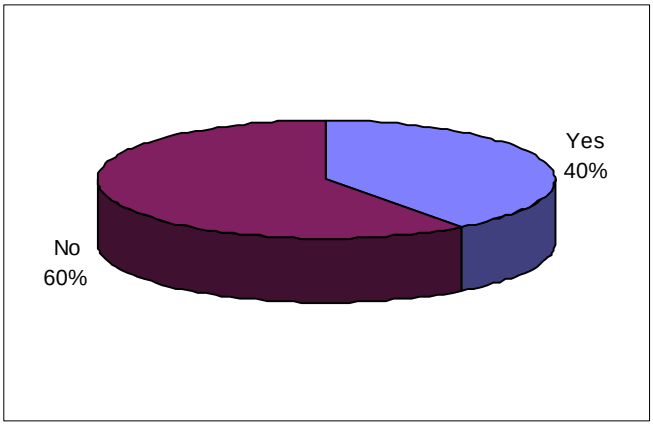


Figure 8. Completion of an Advanced Management Degree (other than AFIT)

Figure 9 shows the break-out of the respondents based on the type of organization. As can be seen from the pie chart, this question resulted in 20% of the respondents answering "other". From the COMMENT section on the surveys, the "other" section is made up predominantly of test centers and IPTs.

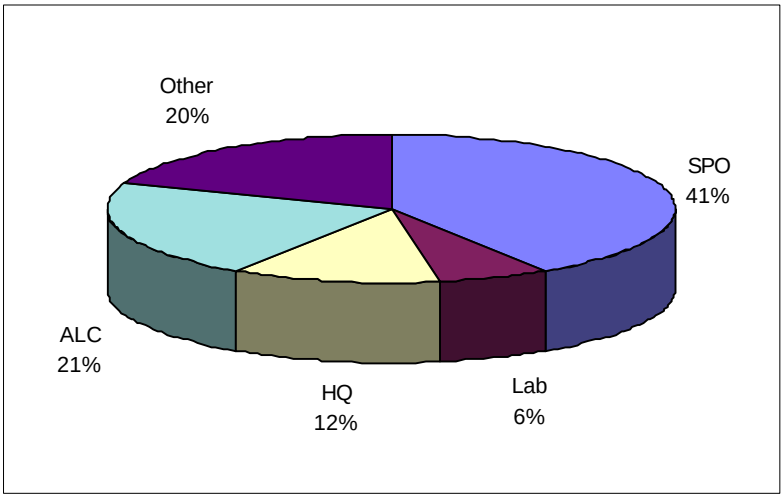


Figure 9. Type of Organization

The following figures show the break-out based on job category. Again, there was a high number of responses to the "other" category. The comments for this question showed that of the 32% other responses, 80% of the personnel work in a mix of cost and budget analyst positions indicating that the financial world is moving towards more of an integrated functional specialty.

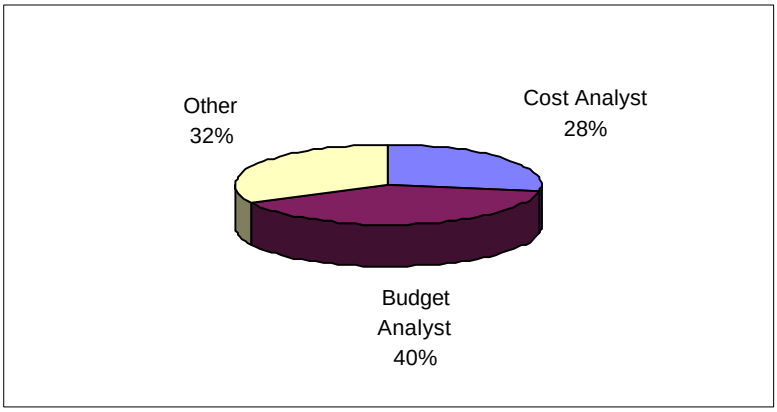


Figure 10. Position Characterization

Figure 11 shows the roles of the individuals within an organization. As can be seen, 49% of personnel work in the area of "overall support" meaning that they tend to support more than one program/project.

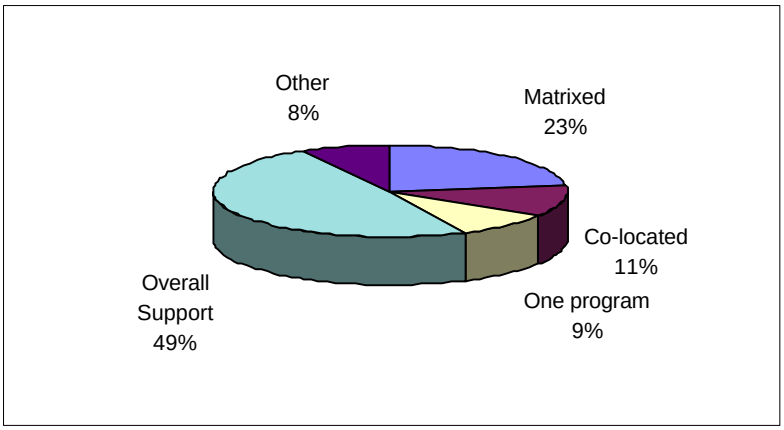


Figure 11. Organizational Arrangement

Finally, Figure 12 shows the level of APDP certification of the respondents. From those surveyed, most are certified at Level 3.

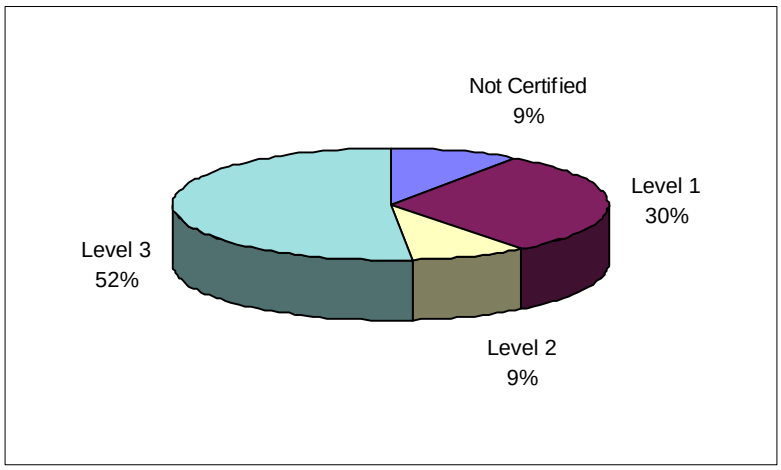


Figure 12. Level of APDP Certification in Financial Management

Instrument Development

As mentioned above, the survey instrument used in the 1994 effort of Baxter and Bolin was again used for this research. While their instrument provided for reliable and valid data, there were a few changes that were necessary. One difficulty with the survey instrument occurred with the biographical questions. Many respondents answered the biographical questions with more than one answer per question. This caused minor difficulties in the analysis of the data. By changing and rewording the biographical questions, an attempt was made to correct this situation. In addition, there were two questions added relating to appropriations. These additions were the result of respondent comments towards the 1994 survey.

Frequency and Importance. Since this research attempts to identify those cost competencies that are valuable to financial personnel, it was necessary to standardize the way the respondents answered each question. Based on the research of Baxter and Bolin, the questions were asked based on the frequency and importance of each competency. Baxter and Bolin's description of why frequency and importance were chosen is as follows:

> The primary attribute of interest in this research was the *value* of each competency. Quantifying value is a difficult task. One approach is to solicit only the *frequency of use* of each competency. Unfortunately, there could be competencies that, although rarely used, are absolutely critical to the success of the program. For example, a program might only develop a work breakdown structure (WBS) once, but the WBS is the base upon which the entire program is built. Therefore, frequency alone is not enough.

> The *importance* of a competency is another indicator of its value. This measure accounts for the value of competencies such as WBS development. Although infrequently used, such competencies could be extremely important. The two measures, frequency and importance, were integrated through use of a decision rule to assess the value of each competency. (Baxter & Bolin, 1994:49)

Based on the follow-on nature of this study, the same "value" designators were used for the competencies.

Again, based on the previous research by Baxter and Bolin, the response scales did not change. The following tables show the response scales used for this research.

Table 4. Frequency Response Scales

1	2	3	4	5	6
Annually or less	Quarterly	Monthly	Weekly	Daily	Don't Know

Table 5. Importance Response Scales

1	2	3	4	5	6
Not Important	Slightly Important	Important	Very Important	Extremely Important	Don't Know

Validity and Reliability. Validity and reliability are necessary in all survey instruments to provide the research study its needed credibility. Emory and Cooper define each term as follows:

- *Validity*: the extent to which a test measures what we actually wish to measure.
- *Reliability*: the consistency in the results of an instrument.

In this research, validity, more specifically internally validity, was emphasized due to the difference between the survey instruments. Internal validity can result from bias in the sample selection process (Spyridakis, 1992:612). Since two survey versions were used it became necessary to ensure that the sample groups completing the survey were similar (Baxter & Bolin, 1994:56). As mentioned earlier in this research, the questions on the surveys are the same, but the scales (frequency vs. importance) differ. In an attempt to ensure that the survey instruments measured what they should and that the respondents were from similar backgrounds, five questions were repeated but were evaluated by the respondents based on the alternative scale. The results of the five questions from one instrument were then compared to the same five questions from the second instrument. These 10 questions, five from the frequency instrument and five from the importance instrument, were tested using a Kruskal-Wallis test to determine if the populations were the same. The hypotheses for this test are as follows:

H_o: The responses are the same.

H_a: Not all responses are the same.

Based on a chosen a=0.05, those questions with p-values less than 0.05 mean that the null hypothesis (H_o) would be rejected and the conclusion is that the populations are not the same. Table 6 shows the results of this Kruskal-Wallis Test.

Table 6. Validity Kruskal-Wallis Test

Question	Frequency	Importance
1	0.8200	**0.0399**
2	0.5503	0.7670
3	0.1945	0.8679
4	0.5096	0.9767
5	0.6167	0.3373

From the above table, the results show that in one of the ten tests show a difference in the populations. This indicates that the two survey groups were the same, in other words, there are no overwhelming results that these groups were not representative of each other. This test also provides some validity to the survey instrument. These results help to support the belief that the survey instrument measured the information that was desired to be measured.

Another test was performed to check the reliability of the survey instrument. Although the best way to test for reliability would be to give a retest, this was neither practical or possible. Therefore, a secondary test for reliability, is to duplicate questions on the survey instrument. For this research, one question was duplicated to measure the reliability. Spearman's rank correlation was used to evaluate the correlation between the two questions. High values (approximately .90) for the correlation would be expected for this test since it is based upon the same question. Table 7 shows the results of this test.

Table 7. Reliability Check Using Correlation

	Frequency	Importance
Correlation	0.8755	0.9370

The above table supports the reliability check. The high correlation values indicate that the survey instrument is providing consistent results based on this test case. As mentioned this result is expected since the two questions were identical.

Data Analysis

After receiving the responses from the field, the answer forms were scanned using an optical scanner and the data were transferred to a disk to be used for analysis. As mentioned in Chapter 1, this research is concerned with three research questions.

Research question 1 is a straight-forward question that addresses which cost competencies are perceived to be most important and which are reportedly used most frequently. To analyze this question, the decision rule used by Baxter and Bolin was followed.

> **Decision Rule:** Any competency whose median values for importance and frequency sum to six (6) or greater is considered valuable. (Baxter & Bolin, 62)

Research questions 2 and 3 are more complicated in that they look at significant differences among subgroups. Research question 2 looked at differences between such subgroups as military vs. civilian, the types of financial analysts, the organization type, and the individual's role in the organization.

Research question 3 addressed the variances identified based on professional continuing education (PCE), graduate management degrees, and Acquisition Professional Development Program (APDP).

The analysis for the differences between subgroups relied upon use of the Kruskal-Wallis test. The hypotheses for the Kruskal-Wallis test are:

H_o: *k* independent samples are from identical populations

H_a: *k* independent samples are not from identical populations (Walpole & Myers, 630)

As with the validity test earlier in this chapter, if the null hypothesis (H_o) would be rejected, the conclusion is that not all samples are from identical populations. Within this research, it would indicate that the subgroups do not believe that the given competencies are equally important or used with the same frequency.

Summary

The research performed identifies cost competencies that are needed by personnel in the financial career field. This objective was accomplished by surveying those individuals within the financial management area of AFMC and soliciting their perspectives on which cost competencies are most important and which are used most frequently. Additionally, the surveys were designed to facilitate comparisons between subgroups of the population based on situational or educational differences. The study examined 535 surveys. The results are presented in the following chapter.

IV. Findings & Analysis

Introduction

This thesis answered three research questions: identifying cost management competencies that are valuable to financial analysts, determining which situational factors influence these competencies, and discovering if educational level influences perceptions regarding selected competencies. The results are based on responses from 535 financial analysts within AFMC. The following sections provide the results from those surveys along with additional competencies that were identified by the respondents.

Importance and Frequency of Cost Management Competencies

Which cost management competencies are valuable to financial analysts in the Defense Acquisition workforce, more specifically, which are perceived to be more important and are used more frequently by financial analysts?

Importance. Based on the scale used in the survey instrument, the categories *Very Important* and *Extremely Important* were used to calculate the percentage of respondents who believed that a particular competency was important to their jobs as financial analysts. Tables 8 and 9 show the 10 most important and 10 least important cost management competencies.

Table 8. Most Important Competencies

Competency	% Rating Very or Extremely Important
Understand the different types of appropriations (3080, 3400, 3600, etc.) and the years they are available (including active, expired, and canceled years)	80.1
Understand the cost elements such as direct labor, direct materials, general & administrative, profit, and overhead	68.9
Understand the impact of inflation on program costs and funding	67.3
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring	66.9
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures	66.9
Understand the role the organization plays in the Planning, Programming, and Budgeting System (PPBS)	64.5
Be able to apply inflation factors to program costs and funding	64.1
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)	58.6
Understand the impact of production rate and quantity decisions on program costs	58.2
Understand the obligation rates set by the Air Force and the implications if these rates are not met	57.8

Table 9. Least Important Competencies

Competency	% Rating Very or Extremely Important
Be able to evaluate contractor cost accounting and control systems	37.1
Understand the cost concepts of reasonableness, allocability, and allowability	36.3
Be able to distribute the cost of work packages across the time horizon to develop a performance measurement baseline (PMB)	36.3
Understand current economic conditions and their impact on defense contractors	35.1
Be able to evaluate contractor financial health and viability using financial statements	35.1
Be able to do break-even analysis using the concepts of fixed and variable costs.	31.1
Be able to apply time value of money techniques such as return on investment (ROI), net present value (NPV), internal rate of return (IRR), and discounted cash flows (DCF)	30.3
Be able to select the appropriate contract type for a project	27.1
Be able to generate congressionally required reports such as the Selected Acquisition Report (SAR)	26.7
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development	10.3

From the above tables, it can be seen that 9 of the 10 most important competencies involve the understanding of the concepts; whereas, 8 of the 10 least important competencies address actually being able to perform the task. This implies that financial analysts believe it is more important to have an understanding of these cost management competencies rather than actually being able to execute the competency.

Frequency. The frequency data was ranked in much the same way as the importance data except that, as the survey scale indicates, the concern is with usage either *daily* or *weekly* to conclude that a competency is frequently

used by financial analysts. Tables 10 and 11 show the 10 most frequently used and 10 least frequently used competencies.

Table 10. Most Frequently Used Competencies

Competency	% Using Daily or Weekly
Understand the different types of appropriations (3080, 3400, 3600, etc.) and the years they are available (including active, expired, and canceled years)	60.6
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures	54.2
Understand cost elements such as direct labor, direct materials, general & administrative, profit, and overhead	45.8
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring	37.5
Understand the congressional budgeting and appropriations process	34.7
Understand the impact of inflation on program costs and funding	34.3
Understand the role the organization plays in the Planning, Programming, and Budgeting System (PPBS)	32.9
Understand the impact of the political environment on acquisition management	30.0
Understand the obligation rates set by the Air Force and the implications if these rates are not met	29.2
Be able to use software tools to support cost estimation, cost analysis, and presentation	27.8

Table 11. Least Frequently Used Competencies

Competency	% Using Daily or Weekly
Be able to evaluate contractor financial health and viability using financial statements	6.5
Be able to evaluate contractor cost accounting and control systems	6.1
Be able to develop an estimate at completion (EAC) based on the data presented in contractor performance reports	6.1
Understand current economic conditions and their impact on defense contractors	5.8
Be able to distribute the cost of work packages across the time horizon to develop a performance measurement baseline (PMB)	5.8
Be able to develop corrective actions to counter unfavorable program variances	5.4
Be able to apply time value of money techniques such as return on investment (ROI), net present value (NPV), internal rate of return (IRR), and discounted cash flow (DCF)	4.3
Be able to do break-even analysis using the concepts of fixed and variable costs	4.0
Be able to select the appropriate contract type for a project	3.6
Be able to generate congressionally required reports such as the Selected Acquisition Report (SAR)	2.5

The frequency tables, as with the importance table, indicate that competencies relevant to understanding are used with more regularity in a financial analysts' job than competencies associated with application. As can be seen from above, 9 out of 10 of the most frequently used tasks involve understanding, while 9 out of 10 of the least frequently used tasks involve application.

Combined Results. As mentioned, the second part of this research question looks at which cost management competencies tend to be most valuable overall to financial analysts. The responses were analyzed using the sum of their medians. If the sum of the median values from the importance and

frequency surveys was greater than six (6) for any question, this competency was said to be valuable. These results indicate that 24 of the 49 competencies were valuable to financial analysts. Table 12 shows the valuable competencies with their respective summed median values in descending order. In addition a complete list of the median values can be seen in Appendix E.

Table 12. Valuable Competencies

Competency	Median Value
Understand the different types of appropriations (3080, 3400, 3600, etc.) and the years they are available (including active, expired, and canceled years)	9
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures	8
Understand cost elements such as direct labor, direct materials, general & administrative, profit, and overhead	8
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring	7
Understand the impact of inflation on program costs and funding	7
Understand the role the organization plays in the Planning, Programming, and Budgeting System (PPBS)	7
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)	7
Understand the congressional budgeting and appropriations processes	7
Understand the obligation rates set by the Air Force and the implications if these rates are not met	7
Be able to apply inflation factors to program costs and funding	7
Understand the impact of production rate and quantity decisions on program cost	7
Be able to use software tools to support cost estimation, cost analysis, and presentation	7
Understand contractor cost reports such as the Cost Performance Report (CPR) and Cost/Schedule Status Report (CSSR)	7
Understand the impact of changes in scope on the cost of defense contracts	7
Understand the use of estimates at completion (EAC) in cost management	7
Understand the products of cost management software tools	6
Understand the implications of uncertainty associated with cost estimates	6
Understand the uses of a WBS for cost management	6
Be able to develop a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)	6
Understand the impact of budget cuts on unit marginal cost	6
Understand the impact of learning curves on production costs	6
Be able to analyze contractor reports such as the CPR and CSSR	6
Understand the concept of earned value and methods for calculating it	6
Be able to develop an estimate at completion (EAC) based on the data presented in contractor performance reports	6

Don't Know Option. The sixth option on the survey response scale was that of *Don t Know*. If a question was not understood, or the participants did not possess any knowledge in this area, this choice could be selected. The Don't Know option was necessary in an attempt to provide the respondents an option if the other five choices did not apply. Since the Don't Know option does not possess any type of valuable meaning to the data responses, it was excluded from the actual data analysis performed. This exclusion was done since questions may have been poorly worded or easily misinterpreted. Appendix F shows the percentage of individuals who responded Don't Know to particular questions. The overall average of respondents who answered Don't Know to each of the frequency and importance surveys are 12.1% and 4.5%, respectively. These percentages indicate that individuals who participated in the frequency survey either did not understand certain questions, or more likely, found it difficult to analyze the competency in terms of the given time periods. On the other hand, the importance surveys indicate that overall the participants understood how the competencies were important in their environment.

Comprehension vs. Application. The survey instrument was developed in such a way that, "The cost management model developed for this study includes competencies at both the comprehension and application levels of learning" (Baxter and Bolin, 1994:72). In other words, this survey looked at the financial analysts' understanding (comprehension) of and ability to apply (application) particular cost competencies. Within this survey there are 31 *understand* competencies and 18 *be able to* competencies that analysts

considered. Earlier analysis indicated 24 of 49 competencies which were valuable to financial analysts. Figure 13 takes these 24 competencies and displays them based on whether they relate to comprehension or application.

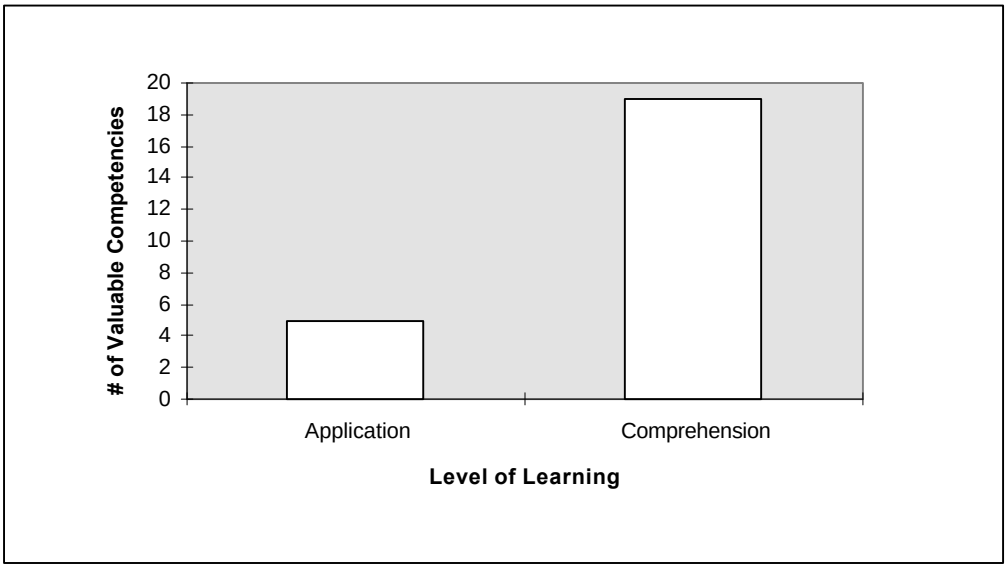


Figure 13. Level of Learning Required for Valuable Competencies

From the above figure, it can be seen that overwhelmingly, the participants found many more comprehension competencies (19 of the 24) to be valuable than application competencies.

Influence of Situational Factors

The second research question looked at personal or situational factors which may influence the perceived value of these cost management competencies. In order to analyze these situational factors, a Kruskal-Wallis test for non-parametric analysis of variance was used to study the subgroups. This test indicates if there is a difference between the perceived views of the

financial analyst subgroup being analyzed. The rejection region for the Kruskal-Wallis test in this research is at an a=0.05. In other words, if the p-value for the Kruskal-Wallis test is less than a=0.05, then the null hypothesis is rejected in favor of the alternative.

Research question 2 looked at four subgroups. These subgroups include military vs. civilian, type of financial analyst, type of organization, and role within the organization. Tables 13-16 show the breakout of responses by subgroup. These responses are based on the biographical questions asked at the beginning of the survey instrument.

Table 13. Military vs. Civilian

Instrument	Military	Civilian
Frequency	98	88
Importance	169	153

Table 14. Type of Financial Analyst

Instrument	Cost	Budget	Other
Frequency	71	111	95
Importance	75	100	76

Table 15. Type of Organization

Instrument	SPO	Lab	HQ	ALC	Other
Frequency	123	19	35	52	48
Importance	93	14	29	60	55

Table 16. Role Within the Organization

Instrument	Matrixed	Collocated	Located W/Functional	Overall Support	Other
Frequency	74	33	23	122	25
Importance	48	26	23	136	18

Based on the Kruskal-Wallis tests performed, Figure 14 shows the number of questions which fell in the rejection region of less than a=0.05 for each subgroup. The subgroups were then analyzed using the results of the Kruskal-Wallis test to infer reasons for any significant differences within a subgroup. The results of the Kruskal-Wallis tests for research question 2 can be seen in Appendix G.

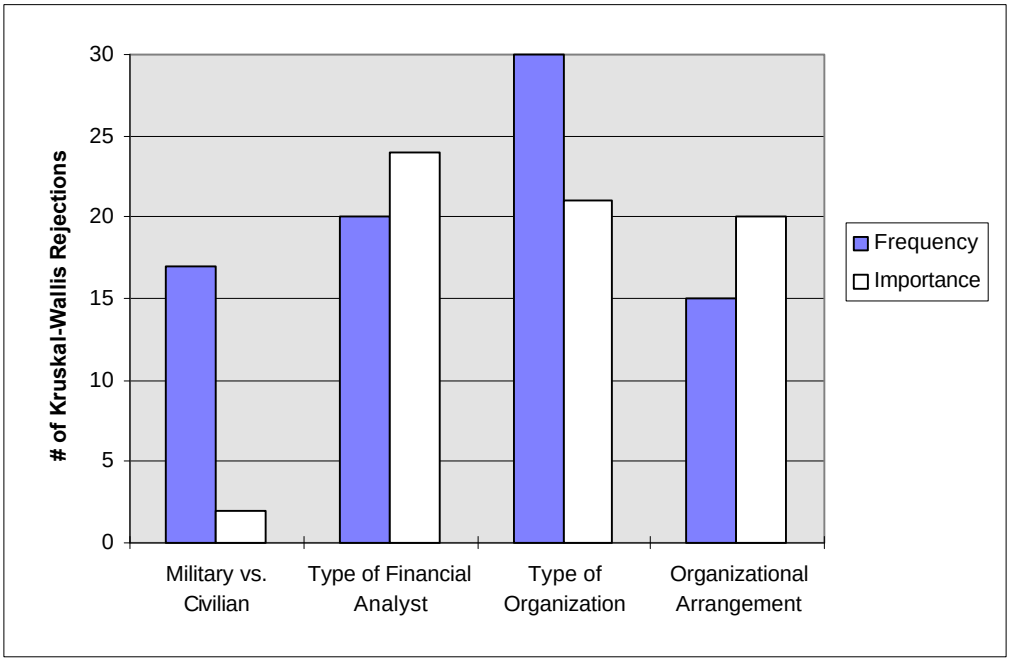


Figure 14. Research Question 2 Kruskal-Wallis Rejections

Military vs. Civilian. The first subgroup analyzed under research question 2 compared military vs. civilian workers and their perceptions of

importance and frequency of the cost management competencies. There were 17 frequency and 2 importance questions that resulted in the rejection of the null hypothesis and the conclusion that not all samples came from the same population. These results indicate that generally there is a significant difference in the perceived *importance* of two cost management competencies between military and civilian employees. As for the perceived *frequency* of use, there are approximately one-third of the Kruskal-Wallis tests indicating a difference between military and civilian employees. Tables 17 and 18 show the frequency and the importance questions along with their accompanying median values that indicate the differences between these subgroups.

Table 17. Frequency Differences Based on Military vs. Civilian

	Subgroup Median	
Competency	**Military**	**Civilian**
Understand the different types of appropriations (3080, 3400, 3600, etc.) and the years they are available (including active, expired, and canceled)	Monthly	Weekly
Understand the results of financial statement analysis conducted to evaluate contractor financial health	Annually or Less	Quarterly
Be able to apply time value of money techniques such as ROI, NPV, IRR, and DCF	Annually or Less	Quarterly
Be able to use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates	Annually or Less	Quarterly
Be able to apply inflation factors to program costs and funding	Quarterly	Monthly
Understand cost elements such as direct labor, direct materials, general & administrative, profit and overhead	Monthly	Weekly
Be able to do break-even analysis using the concepts of fixed and variable costs	Annually or Less	Quarterly
Understand the cost concepts of reasonableness, allocability, and allowability	Annually or Less	Quarterly
Be able to apply learning curve techniques to analyze production costs	Annually or Less	Quarterly
Understand the impact of learning curves on production costs	Annually or Less	Quarterly
Be able to distribute the cost of work packages across the time horizon to develop a PMB	Annually or Less	Quarterly
Understand the composition of a PMB	Annually or Less	Quarterly
Be able to generate congressionally required reports such as the SAR	Annually or Less	Quarterly
Be able to estimate earned value using methods such as weighted milestones and percent complete	Annually or Less	Quarterly
Be able to develop an EAC based on the data presented in contractor performance reports	Annually or Less	Quarterly
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action	Annually or Less	Quarterly
Be able to develop corrective actions to counter unfavorable program variance	Annually or Less	Quarterly

Table 18. Importance Differences Based on Military vs. Civilian

	Subgroup Median	
Competency	**Military**	**Civilian**
Understand the use of estimates at completion (EAC) in cost management	Very Important	Important
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action	Very Important	Important

From the table showing frequency differences, the results show that civilian employees tend to use the competencies more often than the military personnel. Another interesting observation from the frequency table is that many of the competencies that civilians use more often are application competencies rather than comprehension competencies.

Although the Kruskal-Wallis test only indicates there are two differences in importance based on military vs. civilian, these differences appear to have a common bond. The differing competencies are both related to managing cost performance. Further, the military respondents believe that these competencies are more important than the civilian respondents. A possible conclusion could be that military respondents tend to interact more on the managing side of costs, and therefore believe that cost performance standards deserve higher priority from their perspective.

Type of Financial Analyst. The second subgroups studied were different types of financial analysts. The type of financial analyst refers to whether the analyst works in the cost, budget, or some other financial area. The results of the Kruskal-Wallis tests indicate that there are 20 frequency questions

and 24 importance questions which differ based on perceived frequency and importance. One area of concern with this question appears with the number of participants who answered *Other* to the biographical question. By answering Other, the respondents are indicating that they do not specifically work in either the cost or budget field. Based on the comment section at the end of the survey, the majority of these analysts work in program control and in jobs that combine both cost and budget. Due to the large number of individuals (more than 1/3) who answered Other, it becomes difficult to positively conclude that there is a difference between cost and budget personnel; therefore the analysis addressed only those analysts who responded as either cost or budget. Tables 19 and 20 show the 20 frequency and 24 importance questions that were rejected after performing the Kruskal-Wallis test.

Table 19. Frequency Differences Based on Type of Financial Analyst

	Subgroup Median	
Competency	**Cost**	**Budget**
Understand the different types of appropriations (3080, 3400, 3600, etc.) and years they are available	Monthly	Daily
Understand the obligation rates set by the Air Force and the implications if these rates are not met	Quarterly	Weekly
Be able to develop a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)	Monthly	Annually or less
Understand the cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)	Weekly	Quarterly
Be able to use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates	Quarterly	Annually or less
Understand the implications of uncertainty associated with cost estimates	Monthly	Quarterly
Be able to use software tools to support cost estimation, cost analysis, and presentation	Weekly	Annually or less
Understand the products of cost management software tools	Weekly	Quarterly
Be able to apply inflation factors to program cost and funding	Weekly	Quarterly
Understand the impact of inflation on program costs and funding	Weekly	Quarterly
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead	Weekly	Monthly
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring	Weekly	Quarterly
Be able to apply learning curve techniques to analyze production costs	Quarterly	Annually or less
Understand the impact of learning curves on production costs	Quarterly	Annually or less
Be able to develop a WBS that describes the entire work effort	Quarterly	Annually or less
Understand the role the organization plays in the PPBS	Quarterly	Monthly
Understand congressional budgeting and appropriation processes	Quarterly	Monthly
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures	Quarterly	Daily
Understand congressional reporting requirements	Annually or less	Quarterly
Be able to develop an EAC based on the data presented in contractor performance reports	Quarterly	Annually or less

Table 20. Importance Differences Based on Type of Financial Analyst

	Subgroup Median	
Competency	**Cost**	**Budget**
Understand current economic conditions and their impact on defense contractors	Very Important	Slightly Important
Understand the impact of the time value of money on financing and budgeting	Very Important	Important
Be able to develop a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)	Extremely Important	Important
Understand the cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)	Extremely Important	Important
Be able to use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates	Very Important	Important
Understand the implications of uncertainty associated with cost estimates	Extremely Important	Important
Be able to use software tools to support cost estimation, cost analysis, and presentation	Extremely Important	Important
Understand the products of cost management software tools	Extremely Important	Important
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract	Very Important	Important
Be able to apply inflation factors to program cost and funding	Extremely Important	Important
Understand the impact of inflation on program costs and funding	Extremely Important	Very Important
Understand the impact of production rate and quantity decisions on program cost	Extremely Important	Very Important
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead	Extremely Important	Important
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring	Extremely Important	Very Important
Be able to apply learning curve techniques to analyze production costs	Very Important	Important
Understand the impact of learning curves on production costs	Extremely Important	Important
Understand the impact of the time value of money on financing and budgeting	Very Important	Important
Be able to develop a WBS that describes the entire work effort	Very Important	Important

	Subgroup Median	
Competency	**Cost**	**Budget**
Understand the uses of a WBS for cost management	Extremely Important	Important
Be able to evaluate contractor cost accounting and control systems	Very Important	Extremely Important
Understand contractor cost accounting and control systems	Very Important	Important
Understand the use of EAC in cost management	Very Important	Important
Be able to analyze contractor reports such as the CPR and CSSR	Very Important	Important
Understand contractor cost reports such as the CPR and CSSR	Very Important	Important

From looking at Table 19 it can be seen that cost analysts tend to perform the competencies which relate to cost functions more frequently than budget personnel. Parallel to this is that budget personnel use the budget related competencies more than the cost analysts. This is logical due to the focus and nature of these analysts' daily jobs.

Type of Organization. The next subgroup analyzed involved the individual's organization type. Organization type included the System Program Office (SPO), the Laboratory, the Air Logistic Center (ALC), and Headquarters. As with financial analyst type, a choice of Other was provided to the respondents, but was not used for the analysis. Based on comments, many of these individuals work in staff offices, test centers, and Integrated Product Teams. Results from the Kruskal-Wallis test show that there were 30 frequency questions and 21 importance questions which resulted in rejection of the null

hypothesis. In other words, based on their answers, it appears that the individuals' responses vary with the type of organization they work in.

To be consistent with the evaluation methods, the questions' median values were analyzed to see which organizations tend to use the competencies more often and which competencies are perceived to be more important. Tables 21 and 22 show the type of organization and the median values associated with the responses.

Table 21. Frequency Differences Based on Organizational Type

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand the different types of appropriations (3080, 3400, 3600, etc.) and years they are available			ALC	SPO HQ	Lab
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development	SPO Lab HQ	ALC			
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)	Lab	HQ	SPO ALC		
Understand the implications of uncertainty associated with cost estimates		Lab HQ ALC	SPO		
Understand the products of cost management software tools	Lab		SPO HQ ALC		
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract		Lab HQ ALC	SPO		

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Be able to apply inflation factors to program costs and funding		Lab HQ	SPO ALC		
Understand the impact of inflation on program costs and funding		HQ	SPO Lab ALC		
Understand the impact of production rate and quantity decisions on program cost	HQ	Lab	SPO ALC		
Understand the impact of budget cuts on unit marginal costs	Lab HQ	ALC	SPO		
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead			HQ	SPO Lab	ALC
Be able to do break-even analysis using the concepts of fixed and variable costs	SPO Lab HQ	ALC			
Be able to apply learning curve techniques to analyze production costs	SPO Lab HQ	ALC			
Understand the uses of a WBS for cost management		Lab HQ ALC	SPO		
Understand the congressional budgeting and appropriations processes		ALC	SPO HQ	Lab	
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures			HQ ALC	SPO	Lab
Understand the composition of a PMB	HQ ALC	SPO Lab			
Understand contractor cost accounting and control systems	HQ ALC	SPO Lab			
Understand the impact of the political environment on acquisition management		HQ ALC	SPO Lab		
Understand the congressional reporting requirements	ALC	SPO Lab HQ			

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC	HQ ALC	SPO Lab			
Understand the impact of changes in scope on the cost of defense contracts		Lab HQ ALC	SPO		
Be able to estimate earned value using methods such as weighted milestones and percent complete	HQ	SPO Lab ALC			
Understand the concept of earned value and methods for calculating it	ALC	HQ	SPO Lab		
Be able to develop an EAC based on the data presented in contractor performance reports	Lab HQ ALC		SPO		
Understand the use of EAC in cost management	ALC	Lab HQ	SPO		
Be able to analyze contractor reports such as CPR and CSSR	HQ ALC	Lab	SPO		
Understand contractor cost reports such as the CPR and CSSR	ALC	Lab HQ	SPO		
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action	Lab HQ ALC		SPO		
Be able to develop corrective actions to counter unfavorable program variances	Lab HQ		SPO ALC		

Table 22. Importance Differences Based on Organizational Type

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to evaluate contractor financial health and viability using financial statements		ALC	SPO HQ	Lab	
Understand the results of financial statement analysis conducted to evaluate contractor financial health		ALC	SPO HQ	Lab	
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)			ALC	Lab	SPO HQ
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract		ALC	SPO Lab HQ		
Understand the impact of inflation on program costs and funding			ALC	SPO Lab HQ	
Understand the impact of production rate and quantity decisions on program cost				SPO Lab HQ	ALC
Be able to apply learning curve techniques to analyze production costs			Lab HQ ALC	SPO	
Understand the impact of learning curves on production costs			Lab ALC	SPO HQ	
Be able to develop a WBS that describes the entire work effort			Lab HQ ALC	SPO	
Understand the uses of a WBS for cost management			Lab ALC	SPO HQ	
Be able to evaluate contractor cost accounting and control systems		ALC	Lab HQ	SPO	
Understand contractor cost accounting and control systems		ALC	Lab HQ	SPO	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to generate congressionally required reports such as the SAR		ALC	SPO Lab HQ		
Understand the congressional reporting requirements			Lab HQ ALC	SPO	
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC		ALC		SPO Lab HQ	
Be able to estimate earned value using methods such as weighted milestones and percent complete			ALC	SPO Lab HQ	
Understand the concept of earned value and methods for calculating it			ALC	SPO Lab HQ	
Be able to develop an EAC based on the data presented in contractor performance reports			ALC	SPO Lab HQ	
Understand the use of EAC in cost management			ALC	SPO Lab HQ	
Be able to analyze contractor reports such as CPR and CSSR			ALC	SPO Lab HQ	
Understand contractor cost reports such as the CPR and CSSR			ALC	SPO Lab HQ	

As can be seen from above, financial analysts in the SPO tend to use the competencies that are concerned with the actual estimates and how these estimates relate to actual costs. On a monthly basis they are concerned with inflation factors affecting costs, contractor reporting, production rates, and how to correct unfavorable variances. Additionally, many of these same competencies are also the most important competencies to the SPO.

Congressional reporting and understanding and developing a work breakdown structure (WBS) also become critical aspects of the program's life at this stage.

The Laboratory environment is different than that of the SPOs. Laboratories are involved in developing new technologies; therefore, they need to be more concerned with the initial program stages. This difference in focus leads to more budgeting concerns since programs within the laboratory are not well-established, but rather in the research and development phase. As with the SPOs, laboratory financial analysts also believe that contractor checks such as Cost/Schedule Control Systems Criteria (C/SCSC) and contractor performance reports (CPRs) are very important.

The ALC respondents appear to perceive that many of the competencies are important, but the competency that has the most importance is that of production rate and how it affects the program cost. The financial analysts in the ALC also tend to use this competency more often than many of the others. This makes logical sense since the ALCs deal with support equipment and spare parts which are directly impacted when changes in production rate occur. Another frequently used competency is that of understanding direct labor, direct materials, G&A, profit and overhead. These cost elements are used often in the ALCs when determining the rates to charge the customers for repairs and spare parts.

The last major organization type examined was the Headquarters. The Headquarters role is unique in that these analysts are responsible for oversight of the SPO's, Lab's, and ALC's. Because of this role, the headquarters financial

analysts do not use many of the competencies with much frequency, but at the same time, these competencies can be very important to them. For example, the financial analysts do not often perform estimates at completion or analyze contractor reports, but these competencies are perceived to be very important to prevent cost overruns.

Organizational Arrangement. Financial analysts perform their jobs through a variety of organizational arrangements. An individual could be matrixed to a project, collocated with a program office, located within the functional organization supporting one project, or provide overall support to many programs. The responses indicate that the majority of the participants provide overall support to many programs. The Kruskal-Wallis tests indicate that 15 frequency questions and 20 importance questions reject the null hypothesis; therefore, implying that the value of cost management competencies depends on the varying approaches used to organize the financial analysts. Tables 23 and 24 show the organizational arrangement and the median values associated with the responses.

Table 23. Frequency Differences Based on Organizational Arrangement

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Be able to apply time value of money techniques such as ROI, NPV, IRR and DCF	Matrixed Collocated Overall	Functional			
Understand how contractors apply management reserve to respond to contingencies over the duration of the contract		Matrixed Overall	Collocated Functional		
Understand the impact of budget cuts on unit marginal costs		Matrixed Functional Overall	Collocated		
Understand the uses of a WBS for cost management		Overall	Matrixed Collocated Functional		
Understand the congressional budgeting and appropriations processes		Overall	Matrixed Collocated Functional		
Understand the composition of a PMB	Collocated Overall	Matrixed Functional			
Understand contractor cost accounting and control systems	Functional	Matrixed Collocated Overall			
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC		Matrixed Collocated Overall	Functional		
Understand the concept of earned value and methods for calculating it		Collocated Functional Overall	Matrixed		
Be able to develop an EAC based on the data presented in contractor performance reports	Overall		Matrixed Collocated Functional		
Understand the use of EAC in cost management		Overall	Matrixed Collocated Functional		
Be able to analyze contractor reports such as CPR and CSSR		Functional Overall	Matrixed Collocated		

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand contractor cost reports such as the CPR and CSSR		Overall	Matrixed Collocated Functional		
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action	Overall	Collocated Functional	Matrixed		
Be able to develop corrective actions to counter unfavorable program variances	Overall	Matrixed Collocated Functional			

Table 24. Importance Differences Based on Organizational Arrangement

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the impact of the time value of money on financing and budgeting			Matrixed Functional Overall	Collocated	
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development		Functional	Matrixed Collocated Overall		
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract			Functional Overall	Matrixed Collocated	
Be able to apply inflation factors to program costs and funding				Matrixed Collocated Functional	Collocated
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead				Matrixed Functional Overall	Collocated
Understand the impact of the time value of money on financing and budgeting			Functional Overall	Matrixed Collocated	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to distribute the cost of work packages across the time horizon to develop a PMB			Collocated Functional Overall	Matrixed	
Understand the composition of a PMB			Collocated Functional Overall	Matrixed	
Be able to evaluate contractor cost accounting and control systems			Collocated Functional Overall	Matrixed	
Understand contractor cost accounting and control systems			Functional Overall	Matrixed Collocated	
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC			Overall	Matrixed Collocated Functional	
Understand the impact of changes in scope on the cost of defense contracts			Functional Overall	Matrixed Collocated	
Be able to estimate earned value using methods such as weighted milestones and percent complete			Functional Overall	Matrixed Collocated	
Understand the concept of earned value and methods for calculating it			Functional Overall	Matrixed Collocated	
Be able to develop an EAC based on the data presented in contractor performance reports			Overall	Matrixed Collocated Functional	
Understand the use of EAC in cost management			Overall	Matrixed Collocated Functional	
Be able to analyze contractor reports such as CPR and CSSR			Functional Overall	Matrixed Collocated	
Understand contractor cost reports such as the CPR and CSSR			Functional	Matrixed Collocated Overall	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action			Functional Overall	Matrixed Collocated	
Be able to develop corrective actions to counter unfavorable program variances			Functional Overall	Matrixed Collocated	

The median results show that in many cases the financial analysts in matrixed and collocated organizational arrangements tend to use many of the same competencies more frequently and believe the competencies to be more important than those financial analysts in the functional or overall support environment. The analysts in matrixed and collocated organizations are in many cases located away from the staff offices, and therefore are required to perform the financial functions with more regularity than those individuals who perform staff functions. From the above table, analysts in matrixed and collocated organizations use the contractor cost reports and schedule control systems more often than those individuals in functional and overall support roles. The results also show that these same reports are viewed as being more important to these same analysts. On the other hand, analysts in functional and overall support roles tend to feel most of these competencies are important and use the competencies quarterly, but due to their roles within the organization, do not place a high level of emphasis on any one competency.

Influence of Education

The third research question investigated whether or not prior education influenced the perceived value of the cost management competencies. As with research question 2, research question 3 used the Kruskal-Wallis test to determine if there were differences between the subgroups. The subgroups include individuals with Professional Continuing Education (PCE) courses, individuals with graduate management education, and individuals certified at various levels of APDP. These questions were analyzed based on responses from the demographic questions. Tables 25-29 show the results of the demographic questions.

Table 25. Financial Management Courses

Instrument	Yes	No
Frequency	230	47
Importance	209	42

Table 26. Contractor Performance Measurement Courses

Instrument	Yes	No
Frequency	195	82
Importance	171	80

Table 27. AFIT Cost Analysis Master's Degree

Instrument	Yes	No
Frequency	23	254
Importance	14	237

Table 28. Other Graduate Management Degree

Instrument	Yes	No
Frequency	113	164
Importance	98	153

Table 29. Level of APDP Certification

Instrument	None	I	II	III
Frequency	24	79	26	148
Importance	26	80	20	125

Based on the Kruskal-Wallis tests performed, Figure 15 shows the number of questions which fell in the rejection region of less than a=0.05 for each subgroup. The subgroups were then analyzed using the results of the Kruskal-Wallis test to infer reasons for any significant differences within a subgroup. The results of the Kruskal-Wallis tests for research question 3 can be seen in Appendix H.

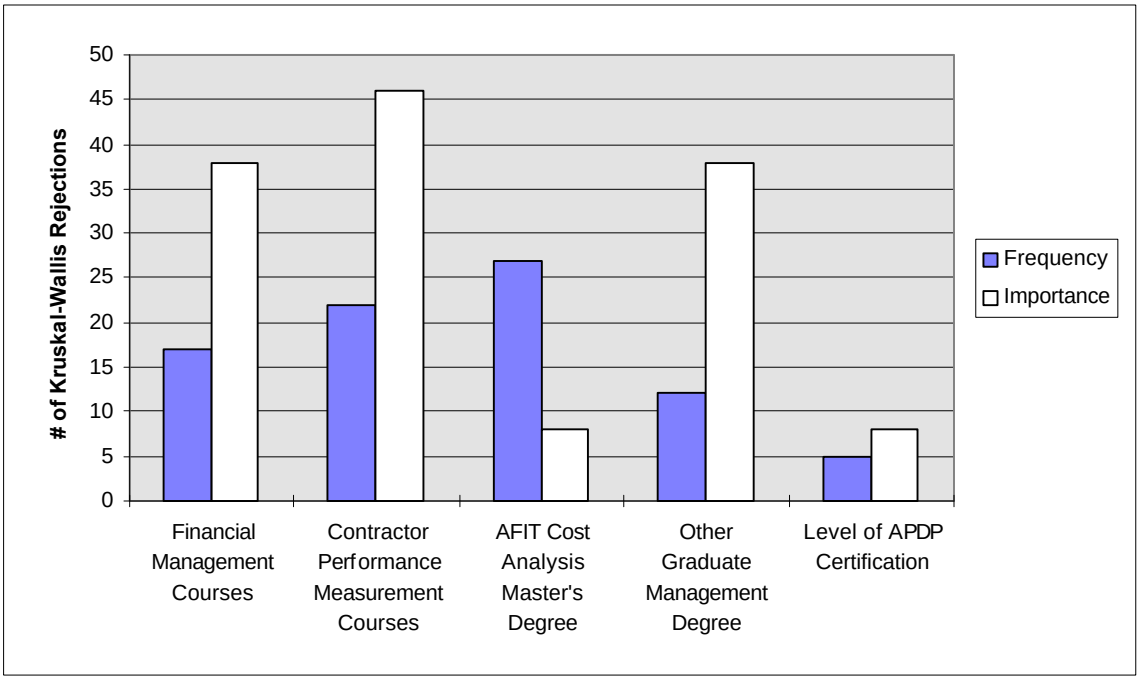


Figure 15. Research Question 3 Kruskal-Wallis Rejections

Professional Continuing Education Courses. The first subgroup analyzed under research question 3 addressed the individual's PCE. The demographic questions requested information based on whether participants had taken financial management or contractor performance measurement courses. These results showed that more than 80% of the participants had taken financial management courses, and nearly 70% had completed contractor performance measurement courses. Kruskal-Wallis tests were then performed on both of these questions to determine if the PCE courses affected the perceived value of the cost management competencies. From the Kruskal-Wallis test, there were 17 frequency questions and 38 importance questions based on financial management courses, and 22 frequency questions and 46 importance questions based on contractor performance measurement courses

which were rejected. These results indicate that there are many cost management competencies which are influenced by the PCE courses the financial analysts receive. Tables 30-31 show the rejected competencies based on the financial management courses' demographic questions and the median values associated with each.

Table 30. Frequency Differences Based on Financial Management Courses

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand the different types of appropriations (3080,3400,3600, etc.) and the years available	Yes	No			
Understand the results of financial statement analysis conducted to evaluate contractor financial health			No	Yes	
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)	Yes	No			
Understand the implications of uncertainty associated with cost estimates		No	Yes		
Be able to use software tools to support cost estimation, cost analysis, and presentation		No	Yes		
Be able to apply inflation factors to program costs and funding		No		Yes	
Understand the impact of inflation on program costs and funding		No	Yes		
Understand the impact of budget cuts on unit marginal costs		No	Yes		

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring		No	Yes		
Be able to apply learning curve techniques to analyze production costs		No	Yes		
Understand the uses of a WBS for cost management	Yes	No			
Understand the role the organization plays in the PPBS		No	Yes		
Understand the congressional budgeting and appropriations processes		No	Yes		
Understand the impact of the political environment on acquisition management		No	Yes		
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC		No	Yes		
Understand the impact of changes in scope on the cost of defense contracts		No	Yes		
Understand contractor cost reports such as the CPR and CSSR		No	Yes		

Table 31. Importance Differences Based on Financial Management Courses

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the different types of appropriations (3080, 3400, 3600) and the years they are available	Yes	No			
Understand the obligation rates set by the Air Force and the implications if these rates are not met				No	Yes
Understand the current economic conditions and their impact on defense contractors			No	Yes	
Be able to evaluate contractor financial health the viability using financial statements		No	Yes		
Understand the results of financial statement analysis conducted to evaluate contractor financial health		No	Yes		
Understand the impact of the time value of money on financing and budgeting		No	Yes		
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development			No	Yes	
Be able to develop a cost estimates using appropriate methods (e.g., parametric, analogy, grass roots)		No	Yes		
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)			No	Yes	
Understand the implications of uncertainty associated with cost estimates			No	Yes	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract			No	Yes	
Understand the impact of budget cuts on unit marginal cost		No	Yes		
Be able to apply learning curve techniques to analyze production costs			No	Yes	
Understand the impact of learning curves on production costs			No	Yes	
Be able to develop a WBS that describes the entire work effort			No	Yes	
Understand the uses of a WBS for cost management			No	Yes	
Understand the role the organization plays in the PPBS			No	Yes	
Understand the congressional budgeting and appropriation processes			Yes	No	
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures			No	Yes	
Be able to distribute the cost of work packages across the time horizon to develop a PMB			No	Yes	
Understand the composition of a PMB		No	Yes		
Be able to evaluate contractor cost accounting and control systems			No	Yes	
Understand contractor cost accounting and control systems		No	Yes		
Be able to select the appropriate contract type		No	Yes		

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the cost implications of alternative contract types and pricing mechanisms		No	Yes		
Understand the impact of the political environment on acquisition management			No	Yes	
Be able to generate congressionally required reports such as the SAR		No	Yes		
Understand congressional reporting requirements		No	Yes		
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC		No	Yes		
Understand the impact of changes in scope on the cost of defense contracts			No	Yes	
Be able to estimate earned value using methods such as weighted milestones and percent complete			No	Yes	
Understand the concept of earned value and methods for calculating it			No	Yes	
Be able to develop an EAC based on the data presented in contractor performance reports		No		Yes	
Understand the use of EAC in cost management		No		Yes	
Be able to analyze contractor reports such as CPR and CSSR			No	Yes	
Understand contractor cost reports such as the CPR and CSSR			No	Yes	
Be able to evaluate contractor-recommended corrective actions, and select an appropriate course of action			No	Yes	

	Importance				
Competency	Not Important	Slightly Important	Important	Very Important	Extremely Important
Be able to develop corrective actions to counter unfavor-able program variances			No	Yes	

The previous two tables represent differences based on the respondent's financial management courses. As stated, the rejected cost management competencies indicate that there are differences in perceived importance and frequency of use based on financial management courses. Additionally, from looking at the associated table's median values, it can be seen that in the majority of the cases, those individuals with financial management courses indicated that the competencies were both more important and more frequently used. Continuing with the study of the influence of PCE courses, Tables 32-33 show the competencies where respondent's who completed the contractor performance measurement courses' reported differently than those who had not completed the courses.

Table 32. Frequency Differences Based on Contractor Performance Measurement Course

	Frequency				
Competency	Annually or less	Quarterly	Monthly	Weekly	Daily
Understand the different types of appropriations (3080, 3400,3600) and the years they are available	Yes	No			
Be able to develop a cost estimate using appropriates methods (e.g., parametric, analogy, grass roots)			No	Yes	

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)		No	Yes		
Understand the implications of uncertainty associated with cost estimates		No	Yes		
Be able to apply inflation factors to program costs and funding		No	Yes		
Understand the impact of inflation on program cost and funding		No	Yes		
Understand cost elements such as direct labor, direct materials, G & A, profit, and overhead		No	Yes		
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring			No	Yes	
Be able to develop a WBS that describes the entire work effort		Yes	No		
Understand the uses of a WBS for cost management	Yes	No			
Understand the composition of a PMB		No	Yes		
Be able to evaluate contractor cost accounting and control systems	Yes	No			
Understand contractor cost accounting and control systems	Yes	No			
Understand the impact of the political environment on acquisition management	No	Yes			
Be able to generate congressionally required reports such as the SAR		No	Yes		
Understand the impact of changes in scope on the cost of defense contracts	No	Yes			

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand the concept of earned value and methods for calculating it		No	Yes		
Be able to develop an EAC based on the data presented in contractor performance reports		Yes	No		
Understand the use of EAC in cost management	No	Yes			
Be able to analyze contractor reports such as CPR and CSSR		No	Yes		
Understand contractor cost reports such as the CPR and CSSR		Yes	No		
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action		No	Yes		

Table 33. Importance Differences Based on Contractor Performance Measurement Course

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the different types of appropriations (3080, 3400, 3600) and the years they are available	Yes	No			
Understand the current economic conditions and their impact on defense contractors				No	Yes
Be able to evaluate contractor financial health the viability using financial statements		No	Yes		

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the results of financial statement analysis conducted to evaluate contractor financial health		No	Yes		
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development		No	Yes		
Be able to develop a cost estimates using appropriate methods (e.g., parametric, analogy, grass roots)		No	Yes		
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)			No	Yes	
Be able to use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates			No	Yes	
Understand the implications of uncertainty associated with cost estimates		No		Yes	
Be able to use software tools to support cost estimation, cost analysis, and presentation			No	Yes	
Understand the products of cost management software tools			No	Yes	
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract			No	Yes	
Be able to apply inflation factors to program costs and funding			No	Yes	
Understand the impact of inflation of program costs and funding				No	Yes

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the impact of production rates and quantity decisions on program cost			No	Yes	
Understand the impact of budget cuts on unit marginal cost			No	Yes	
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead			No	Yes	
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring			Yes	No	
Understand the cost concepts of reasonableness, allocability, and allowability			No	Yes	
Be able to apply learning curve techniques to analyze production costs			No	Yes	
Understand the impact of learning curves on production costs			No	Yes	
Understand the impact of the time value of money on financing and budgeting			No	Yes	
Be able to develop a WBS that describes the entire work effort			No	Yes	
Understand the uses of a WBS for cost management			No	Yes	
Understand the role the organization plays in the PPBS			No	Yes	
Understand the congressional budgeting and appropriation processes			No	Yes	
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures			No	Yes	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to distribute the cost of work packages across the time horizon to develop a PMB			No	Yes	
Understand the composition of a PMB		No	Yes		
Be able to evaluate contractor cost accounting and control systems			No	Yes	
Understand contractor cost accounting and control systems		No	Yes		
Be able to select the appropriate contract type for a project			No	Yes	
Understand the cost implications of alternative contract types and pricing mechanisms		No	Yes		
Understand the impact of the political environment on acquisition management			No	Yes	
Be able to generate congressionally required reports such as the SAR		No	Yes		
Understand congressional reporting requirements		No	Yes		
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC		No	Yes		
Understand the impact of changes in scope on the cost of defense contracts		No		Yes	
Be able to estimate earned value using methods such as weighted milestones and percent complete			No	Yes	
Understand the concept of earned value and methods for calculating it		No	Yes		

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to develop an EAC based on the data presented in contractor performance reports			No	Yes	
Understand the use of EAC in cost management			No	Yes	
Be able to analyze contractor reports such as CPR and CSSR			No	Yes	
Understand contractor cost reports such as the CPR and CSSR			No	Yes	
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action			No	Yes	
Be able to develop corrective actions to counter unfavorable program variances			No	Yes	

As with the financial management courses, the rejection of a cost management competency indicates differences in perceived importance and frequency of use between those respondents with and without contractor performance measurement courses. Similarly, the results suggest that those individuals with contractor performance measurement courses believe the competencies to be more important and use the competencies more frequently. Indeed in 44 out of 46 cases, financial analysts who completed the courses rated the competencies as more important, and 15 out of 22 cases rated the competencies as more frequently used. The results from Tables 30-33 supports

the research question that education influences the perceived importance and frequency of use of cost management competencies.

Graduate Management Degree. The second subgroup analyzed involves those individuals with graduate management degrees. For this analysis, individuals with either an AFIT Cost Analysis Master's degree or any other graduate degree were considered. Less than 10% of those surveyed had an AFIT Cost Analysis Master's, and 40% had a graduate degree other than from AFIT. From the Kruskal-Wallis tests, there are 27 frequency and 8 importance questions based on an AFIT degree, and 12 frequency and 38 importance questions based on a graduate management degree that were rejected. Tables 34-35 show the rejected competencies based on completion of an AFIT Cost Analysis Master's Degree and the median values associated with each.

Table 34. Frequency Differences Based on AFIT Cost Analysis Master's Degree

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand the results of financial statement analysis conducted to evaluate contractor financial health	No	Yes			
Be able to apply time value of money techniques such as ROI, NPV, IRR and DCF	No	Yes			
Understand the impact of the time value of money on financing and budgeting		No	Yes		

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Be able to develop a cost estimate using appropriated methods (e.g., parametric, analogy, grass roots)		No	Yes		
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)			No	Yes	
Be able to use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates	No	Yes			
Understand the implications of uncertainty associated with cost estimates		No		Yes	
Be able to use software tools to support cost estimation, cost analysis, and presentation			No	Yes	
Understand the products of cost management software tools		No		Yes	
Be able to apply inflation factors to program costs and funding		No		Yes	
Understand the impact of inflation on program costs and funding			No	Yes	
Understand cost elements such as direct labor, direct materials, G&A, profit and overhead			No	Yes	
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring			No	Yes	
Be able to apply learning curve techniques to analyze production costs	No		Yes		

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Understand the impact of learning curves on production costs		No	Yes		
Understand the impact of the time value of money on financing and budgeting		No	Yes		
Be able to develop a WBS that describes the entire work effort	No	Yes			
Understand the uses of a WBS for cost management		No		Yes	
Understand the role the organization plays in the PPBS			No	Yes	
Be able to distribute the cost of work packages across the time horizon to develop a PMB		No	Yes		
Understand the cost implications of alternative contract types and pricing mechanisms	No	Yes			
Understand the impact of the political environment on acquisition management		No		Yes	
Understand congressional reporting requirements		No	Yes		
Understand the impact of changes in scope on the cost of defense contracts		Yes	No		
Understand the concept of earned value and methods for calculating it		Yes	No		
Understand contractor cost reports such as the CPR and CSSR		Yes	No		
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action		Yes	No		

Table 35. Importance Differences Based on AFIT Cost Analysis Master's Degree

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the results of financial statement analysis conducted to evaluate contractor financial health			No	Yes	
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development			No	Yes	
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)				No	Yes
Understand the implications of uncertainty associated with cost estimates				No	Yes
Understand the cost implications of alternative contract types and pricing mechanisms			No	Yes	
Understand the concept of earned value and methods for calculating it			No	Yes	
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action			No	Yes	
Be able to develop corrective actions to counter unfavorable program variances			No	Yes	

The above rejection results indicate that there is a difference in the frequency of use of many cost management competencies. These results also suggest that those individuals who possess an AFIT Cost Analysis Master's Degree tend to use most of the competencies more often. Further study reveals

that four competencies show a distinct difference in the frequency of use. In these four cases, the medians differ by two intervals on the frequency response scale. This result deserves attention since the four competencies where this occurs all have dedicated courses within the AFIT Cost Analysis Master's curriculum. This helps to support the premise that graduate management education, specifically an AFIT Cost Analysis Master's Degree, does influence the perceived frequency of use of cost management competencies. Additionally, these results show that there are eight cost management competencies that differ based on perceived importance of the competency. In all eight cases, financial analysts with an AFIT Cost Analysis Master's Degree indicated the competencies were more important. Continuing with the study of the influences of education, Tables 36-37 show the rejected competencies based on possessing a Graduate Management Degree (other than AFIT) and the median values associated with each.

Table 36. Frequency Differences Based on Other Graduate Management Degree

	Frequency				
Competency	**Annually or less**	**Quarterly**	**Monthly**	**Weekly**	**Daily**
Be able to apply inflation factors to program costs and funding		Yes	No		
Understand cost elements such as direct labor, direct materials, G&A, profit and, overhead			Yes	No	

Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring		No	Yes		
Be able to do break-even analysis using the concepts of fixed and variable costs	No	Yes			
Understand the role the organization plays in the PPBS		No	Yes		
Understand contractor cost accounting and control systems		No	Yes		
Be able to select the appropriate contract type for a project	Yes	No			
Understand the impact of the political environment on acquisition management		Yes	No		
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC	No	Yes			
Understand the concept of earned value and methods for calculating it	No	Yes			
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action	No	Yes			
Be able to develop corrective actions to counter unfavorable program variances	No	Yes			

Table 37. Importance Differences Based on Other Graduate Management Degree

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand the different types of appropriations (3080, 3400, 3600) and the years they are available				No	Yes
Understand the current economic conditions and their impact on defense contractors			No	Yes	
Understand the results of financial statement analysis conducted to evaluate contractor financial health			No	Yes	
Be able to apply time value of money techniques such as ROI, NPV, IRR, and DCF			No	Yes	
Understand how contractors secure funds to support ongoing projects, plant improvements, and new product development			No	Yes	
Be able to develop a cost estimates using appropriate methods (e.g., parametric, analogy, grass roots)				No	Yes
Understand cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)				No	Yes
Be able to use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates			No	Yes	
Understand the implications of uncertainty associated with cost estimates			No	Yes	
Understand the products of cost management software tools			No	Yes	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand how contractors apply management reserve to respond to contingencies over the duration of a contract			No	Yes	
Understand the impact of inflation on program cost and funding			No	Yes	
Understand the impact of budget cuts on unit marginal cost			No	Yes	
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead			No	Yes	
Understand ways to characterize costs such as fixed/variable and recurring/nonrecurring			No	Yes	
Understand the cost concepts of reasonableness, allocability, and allowability			No	Yes	
Be able to apply learning curve techniques to analyze production costs			No	Yes	
Understand the impact of learning curves on production costs			No	Yes	
Be able to develop a WBS that describes the entire work effort			No	Yes	
Understand the uses of a WBS for cost management			No	Yes	
Understand the role the organization plays in the PPBS			No	Yes	
Understand the composition of a PMB			No	Yes	
Be able to evaluate contractor cost accounting and control systems		Yes	No		

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Understand contractor cost accounting and control systems		Yes	No		
Be able to select the appropriate contract type for a project		No	Yes		
Understand the cost implications of alternative contract types and pricing mechanisms			Yes	No	
Be able to generate congressionally required reports such as the SAR		No	Yes		
Understand congressional reporting requirements			No	Yes	
Understand the legal and regulatory requirements for cost and schedule control systems such as C/SCSC			No	Yes	
Understand the impact of changes in scope on the cost of defense contracts			No	Yes	
Be able to estimate earned value using methods such as weighted milestones and percent complete			No	Yes	
Understand the concept of earned value and methods for calculating it			No	Yes	
Be able to develop an EAC based on the data presented in contractor performance reports			No	Yes	
Understand the use of EAC in cost management			No	Yes	
Be able to analyze contractor reports such as CPR and CSSR			No	Yes	
Understand contractor cost reports such as the CPR and CSSR			No	Yes	

	Importance				
Competency	**Not Important**	**Slightly Important**	**Important**	**Very Important**	**Extremely Important**
Be able to evaluate contractor-recommended corrective actions and select an appropriate course of action			No	Yes	
Be able to develop corrective actions to counter unfavorable program variances			No	Yes	

The results of the Kruskal-Wallis tests lead to the conclusion that there are differences in the perceived frequency of use and importance of cost management competencies based on a Graduate Management Degree. Although there are only 12 differences based on the frequency of use of the cost management competencies, in 8 of the 12 cases, the financial analysts use the competencies more often and have a graduate management degree. Additionally in 35 out of 38 cases, the differences based on importance show that respondents who possess a graduate management degree indicated that the competencies were more important in their work environments. The results from Tables 34-37 provide support for the research that graduate management education influences the perceived importance and frequency of use of the cost management competencies.

Level of APDP Certification. The final subgroup studied involved the level of APDP certification the participants had acquired in financial management. Of the 535 respondents surveyed, over 50% were level 3 certified in Financial Management. This would lead to the expectation that the null

hypothesis would be rejected, and the conclusion that APDP certification level does indeed affect the perceived value of cost management competencies. The results of the Kruskal-Wallis tests do not support this alternative. Of the 49 questions, only 5 frequency and 8 importance questions were rejected. These results indicate that some competencies are affected by APDP certification level, but the majority are not affected. Tables 38 and 39 show the median results of the rejected competencies.

Table 38. Frequency Differences Based on APDP Certification

	Subgroup Median			
Competency	**Level I**	**Level II**	**Level III**	**Not Certified**
Understand the different types of appropriations (3080, 3400, 3600, etc.) and the years they are available	Weekly	Daily	Daily	Daily
Understand cost elements such as direct labor, direct materials, G&A, profit, and overhead	Weekly	Weekly	Weekly	Monthly
Understand the congressional budgeting and appropriations processes	Monthly	Weekly	Weekly	Weekly
Understand the flow of funds through the expenditure categories of commitments, obligations, and expenditures	Weekly	Weekly	Weekly	Weekly
Understand the cost implications of alternative contract types and pricing mechanisms	Monthly	Monthly	Weekly	Monthly
Understand the impact of the political environment on acquisition management	Monthly	Monthly	Monthly	Monthly
Understand the concept of earned value and methods for calculating it	Monthly	Weekly	Weekly	Weekly
Be able to develop corrective actions to counter unfavorable program variances	Monthly	Weekly	Monthly	Monthly

Table 39. Importance Differences Based on APDP Certification

	Subgroup Median			
Competency	**Level I**	**Level II**	**Level III**	**Not Certified**
Be able to apply time value of money techniques such as ROI, NPV, IRR, and DCF	Not Important	Not Important	Not Important	Not Important
Understand the impact of budget cuts on unit marginal costs	Slightly Important	Slightly Important	Important	Important
Be able to do break-even analysis using the concepts of fixed and variable costs	Not Important	Not Important	Not Important	Slightly Important
Understand the impact of the time value of money on financing and budgeting	Slightly Important	Not Important	Slightly Important	Not Important
Understand the concept of earned value and methods for calculating it	Slightly Important	Slightly Important	Slightly Important	Important

Tables 38 and 39 show that there is no logical pattern in the responses based on the certification level. From this analysis, the data suggests that the APDP certification level has very little effect on the perceived value of the cost competencies.

Omitted Competencies

Each survey provided the respondents an opportunity to identify areas they believed essential to any cost competency model. Table 40 presents the omitted topics addressed by the respondents from most to least often cited, and further separated by their survey type.

Table 40. Omitted Topics

Omitted Topic	Frequency Cited	Survey Type
Scheduling analysis & development	42	Both
Risk analysis/Integrated risk assessment	34	Both
Sources & locating cost data	31	Both
More emphasis on budgeting issues	28	Both
Being able to document cost estimates	27	Both
Estimating risk	24	Importance
Life cycle cost management	19	Importance
Integration of schedule and technical risk into the program cost	17	Importance
More emphasis on Air Force obligation rates	15	Importance
Performing “what-if” analysis	15	Importance
Understanding cost accounting principles	14	Importance
Understanding unit cost resourcing & fee for service	13	Importance
Understanding the relationship of the contractor	13	Importance
Be able to perform operating & support cost estimates	11	Importance
Develop financial plans	9	Importance
Understand the political impact on cost management	8	Frequency
Scheduling to cost performance	8	Frequency
Understand the Air Force cost/data systems	8	Frequency
Understand systems engineering	6	Frequency
Software management & software cost models	5	Frequency
Contractor supervision & management	5	Frequency
Be able to interpret & brief cost estimates to Program Manager	3	Frequency
Be able to use cost models such as price, ace-it, etc.	1	Frequency
Understand & be able to perform an economic analysis	1	Frequency

Of the above omitted competencies, the most often cited omitted competencies were 1) scheduling analysis & development and 2) risk analysis/integrated risk assessment. One respondent wrote on the issue of

scheduling, “As long as the responsibility for scheduling rests within FM, ability to build, analyze, and understand impacts of schedules on program funds is important.” This is a key point at a time when job description lines are attempting to be drawn. Since schedule variance has a direct impact on the cost of a system, it is necessary for the financial analysts to have scheduling inputs. As for risk analysis/integrated risk assessment, this is becoming an area of concern for the upper management. With the publicity received by cost and schedule overruns in acquisition programs, management is becoming risk averse and requiring their analysts to perform detailed risk analysis.

Conclusion

This research produced responses from 535 individuals in the financial management arena. Based on their responses, analysis was performed to determine which competencies were perceived to be valuable. Additionally, selected subgroups within the financial management area were examined to see if varying factors influenced the perceived values of the competencies. Those competencies characterized as comprehension level competencies were substantially more valuable to analysts than application level competencies. This could be due to the abundance of contractor financial assistance that is available in the DoD environment. If a problem were to arise on the “how to do something” aspect, the financial analyst often has the contractor resources to turn to for support.

The results of the analysis provided supporting evidence that the value of the competencies varies between the differing subgroups. The first subgroup was studied in an attempt to determine if situational factors such as military vs. civilian workers, the type of financial analyst, the organization type, or the organizational arrangement influenced the perceived importance and frequency of use of the cost management competencies. From the Kruskal-Wallis, it was seen that, overall, situational factors did affect the perceived value of these competencies. In addition, the median results of the rejected competencies assisted in concluding how each subgroup differs in terms of reported importance and frequency.

The second subgroup analyzed the influence of education on the perceived value of these competencies. Again the results provided evidence that education has an affect over the competencies' importance and frequency of use. This subgroup looked at varying forms of education including Professional Continuing Education, Graduate Management Degrees, and level of APDP certification. Overall, there seems to be influence from all the education subgroups except for the level of APDP certification. Finally, the results provided topic areas where the respondents felt there may be need of more research.

V. Conclusions and Recommendations

Introduction

With a defense budget that approaches $300 billion a year (Gansler, 1989:4), effective cost management is a priority with not only the Congress, but also with the workers in the financial management field. As costs increase, cost overruns also seem to be increasing with the average cost overrun on a weapon system reaching 40% (Gansler, 1989:4). The problem now becomes, how do we control these costs and their corresponding overruns? The initial step is to ensure that the cost estimates are valid in the beginning. Cost estimates will rarely prove exact. Changes in requirements and uncertainty make this a fact, but if the financial analysts possess the proper tools to formulate these estimates and understand the conditions which lead to departures from the expected costs, they may be able to keep costs in check.

This research attempted to identify those skills which were perceived valuable to financial analysts and to answer three research questions. The three research questions were: 1) Which cost management competencies are valuable to financial analysts in the Defense Acquisition work force? 2) What personal or situational factors influence the perceived value of cost management competencies? and 3) Does prior education influence the perceived value of selected cost management competencies? Based on these questions, a survey instrument that consisted of 49 competencies was mailed to 978 financial

analysts within AFMC. The 978 surveys were split into two groups. Although the competencies remained the same, half of the surveys emphasized the frequency of use of the given competency while the remaining half emphasized the importance of the competency. The purpose of the survey was to solicit the financial analysts' perceptions concerning which cost management competencies were valuable to their job. Of the 978 surveys mailed, 535 responses were received for a 54.7% response rate. The results of these surveys were used to answer the research questions and draw conclusions from these results. This chapter continues by presenting the conclusions, providing recommendations, offering suggestions for further study, and closing with study limitations.

Conclusions

The 24 valuable competencies provide a framework for future education of the financial analysts. This may provide insight for course directors that the comprehension of cost management functions are valuable to financial analysts given their education thus far. Further the results show that financial analysts who possess additional education use many of the comprehension and application competencies more often; therefore, if subsequent education emphasized more application level instruction, the result would be more frequent use of application level competencies. Additionally, the study provided useful information concerning the subgroups analyzed. Overall, the study shows that

situational factors and education have an influence on the perceived value of cost management competencies.

Competency-Based Education Programs in the DoD. As mentioned earlier in this research, competency-based education is moving into the DoD education arena. The first step in this process, determining the experience and educational requirements, has been established and the competencies identified. Further steps, which have begun, need to continue. These steps include the piloting and reviewing of new courses. With the competency-based approach came the decision to establish purple-suited courses; courses common for all military branches. Many of these new courses are being taught and have been approved by the DAU, while still others have begun their pilot programs and are now being offered to the financial analysts in the field. These courses have adapted many of the competencies identified in this research in an effort to improve upon the education of the DoD workforce.

Future Movements in Financial Analysis. As the Department of Defense downsizes and organizations are forced to do more with less, it becomes necessary that the workers are able to perform more functions. Many of the respondents indicated this sentiment in the *Comments* section of the survey. Three comments received from the respondents state:

> I have to have well-rounded analysts working for me. It's not sufficient/practical to only have an understanding of cost management. Todays IPT'ed resource has to understand all financial management topics.

> I feel it is important that Cost Analysts and Budget Analysts get almost identical training (in terms of classes). Especially in the light of the "financial analyst" concept.
>
> I would definitely like to see an increased emphasis on training that meets the needs of the do-all, be-all type of shop.

These comments reflect the true "financial analyst" concept. This concept incorporates the idea of combined financial management function, one that allows for the individual to be well-versed in both budgetary functions and in cost analysis type functions. As movements toward the "well-rounded" analyst continue, these ideas will continue to surface and continuing education will need to further move in these directions.

Recommendations

With many of the competencies from this research already incorporated in the pilot courses, the main focus of the course directors and the DAU needs to be on evaluating these courses and ensuring that they are meeting their desired objectives. By performing these evaluations, continual improvement in the current professional continuing education programs can occur and the DoD financial analysts should receive the needed education.

The 24 valuable competencies need to be continually studied to ensure they are being emphasized in the current educational programs. To reiterate the earlier evaluation, 19 of these competencies emphasize comprehension and 5 emphasize application. Again, this leads to the conclusion that, in today's environment, understanding the competencies is more valuable in many cases

than applying the competencies. In order to ensure that application competencies are also deemed valuable, changes in the education style need to be made. By emphasizing application competencies, financial analysts will have a better foundation to practice those competencies in their work environment. Changes towards a more application-based teaching emphasis may lead to application competencies becoming more valuable to the financial analysts thus balancing the comprehension and application aspects of the cost management competencies.

Follow-On Research

This section attempts to identify areas for follow-on research. As mentioned throughout this research, this effort was based on the 1994 research performed by Baxter and Bolin. Baxter and Bolin were responsible for the development of the initial survey instrument and focused their research on the program manager.

Incorporating the Current Survey Instrument. A possible study could use the survey instrument already used for the 1994 research effort and this research to focus on a particular type of organization. In other words, rather than focusing on program managers and financial analysts, focus instead upon the SPO, the Laboratory, the ALC, etc. Within the organization, the study could then focus on the individual's position, whether it be program manager, financial analyst, contracting specialist, and see how the different functional areas respond to the questions within a particular organization type. This type of

research could help in narrowing down who performs the functions within an organization.

Incorporating Cost and Budgetary Functions. Many respondents indicated the need for the financial analyst to be able to perform a wide range of tasks within both cost and budget. Possible research could include researching the movement towards this area and how the DoD plans to incorporate this change as the downsizing continues. Along these same lines, the research could involve going out into the financial field, whether by surveys or personal interviews, to solicit the opinions of financial personnel to determine if the majority believe that a combined budget and cost function is necessary. If this type of research is chosen, it may be necessary to distinguish between the different levels of management in an attempt to classify the results.

Competency-Based Professional Continuing Education. This research also looked at the competency-based approach and how it is being used in the different areas of education including within higher education, in the commercial sector, and professional continuing education. To continue on this competency-based path, further research could be conducted into using the competency-based approach within PCE. This research could involve performing an evaluation of the current programs in an attempt to see how the competency-based approach has been adapted and incorporated into professional continuing education. The research could further determine if changes are needed to the current methods of instructions. A possible method to conduct this research could involve the development of a survey instrument to

be given to individuals taking PCE courses. This survey instrument could address the methods of instruction, the format of the course, the materials addressed, and any comments for improvement. These results could then be used to make recommendations for possible changes in the current competency-based curriculum.

Study Limitations

Limitations of this research effort are attributable to the following areas. The first limitation is due to the inability to address all cost management competencies. Although every effort was made to capture all the cost management competencies required by financial analysts, there are some competencies that respondents indicated a need for further study. A second limitation is due to the population studied. These results are valid only within the population of Air Force Materiel Command since it was the only organization surveyed. Further research that extends Air Force wide, or possibly DoD wide, could provide additional information to support the results of this study. A third significant limitation is the inability to measure the effectiveness of the financial analysts surveyed. Even with the above mentioned limitations, this study provided useful results concerning the competencies used by financial analysts.

Appendix A: Glossary of Terms

Acquisition. A term used with the DoD to denote the aggregation of efforts to develop, produce, and provide a weapon system to the user. It commences in the conceptual phase and is completed at such time as the last production unit is provided to the user. It excludes all operational activities associated with the mission application of the acquired weapon system. (TASC, A-2)

Acquisition Corps. A subset of DoD Component's acquisition workforce, composed of selected military and civilian personnel in grades of Lieutenant Commander, Major, General Schedule and/or General Manager (GS/GM) 13 and above, who are acquisition professionals. There is one Acquisition Corps for each Military Department and one for all the other DoD Components (including the OSD and the Defense Agencies). (DoDI 5000-58, 1992:2-1)

Acquisition Experience. Experience gained while assigned to an acquisition position. Also include intern, exchange, education or training with industry, and other acquisition developmental assignments. Includes experience in DoD acquisition positions and in comparable positions outside the Department of Defense. (DoDI 5000-58, 1992:2-1)

Acquisition Organization. An organization, including its subordinate elements, whose mission includes planning, managing and/or executing acquisition programs which are governed by DoD Directive 5000.1, DoD Instruction 5000.2, and related issuances. (DoDI 5000-58, 1992:2-1)

Acquisition Positions. Civilian positions and military billets that are in the DoD acquisition system, have acquisition duties, and fall in an acquisition position category established by the USD(A). While most frequently located in organizations having an acquisition mission, acquisition positions are also located in management headquarters organizations, management headquarters support organizations, and other organizations. (DoDI 5000-58, 1992:2-1)

Acquisition Program. A directed, funded effort that is designed to provide a new or improved materiel capability in response to a validated need. (DoDI 5000-58, 1992:2-1)

Acquisition Workforce. The personnel component of the acquisition system. The acquisition workforce includes permanent civilian employees and military members who occupy acquisition positions, who are members of an Acquisition Corps, or who are in acquisition development programs. (DoDI 5000-58, 1992:2-1)

Certification. A process through which it is determined that an individual meets all the education, training, and experience standards established for his or her acquisition career field or position, or for membership in the Acquisition Corps. (DoDI 5000-58, 1992:2-1)

Competencies. Worthy accomplishments that make the employee valuable to the employer and that make the employer valuable to the customer. (Blank, 1982:58)

Cost. The amount paid or payable for the acquisition of materials, property, or services. In contract and proposal usage denotes dollars and amounts exclusive of fee or profit (i.e., cost does not include profit or fee). Although dollars are normally used as the unit of measure, the broad definition of cost equates to economic resources; i.e., manpower, equipment, real facilities, supplies, and all other resources necessary for weapon, project, program, or agency support systems, and activities. (TASC, A-20)

Cost Effectiveness. The measure of the benefits to be derived from a system with cost as the primary or one of the primary measures. (TASC, A-21)

Cost Estimating. The process of predicting the future cost of something based on information known today. It includes selecting estimating structures, collecting, evaluating and applying data, choosing and applying estimating methods, and providing full documentation. (TASC, A-22)

Life Cycle Cost. An approach to costing that considers all costs (Government and contractors) incurred during the projected life of the system, subsystem, or component. It includes total cost of ownership over the system life cycle including the cost to develop, produce, operate, support, and dispose of a system, subsystem, or component. (TASC, A-24)

Taxonomy. A classification by subject. A breakout by similarly grouped subject characteristics. (Bloom, 1956:18)

Appendix B: Survey Instrument

MEMORANDUM FOR SURVEY RESPONDENTS

FROM: HQ AFMC/FM
4375 Chidlaw Rd, Suite 6
WPAFB, OH 45433-5006

SUBJECT: Financial Analyst Cost Management Survey Package

In these days of declining budgets and increasing costs, effective cost management is a high priority for all of us in the financial management career field. In order to determine if we are providing the proper training and emphasizing the correct material, we are studying the importance and frequency of a wide variety of cost management competencies. As a member of the financial analyst career field, you were selected to participate in this research. Your participation will help our efforts to improve the training and education of our Financial Management personnel.

This is not a test, and there are no incorrect answers. Your answers will be used to improve our current education and training programs, so please take your time and answer the questions thoroughly. A pretest of this survey indicates that it will take you approximately 11 minutes to complete.

Participation in this research is strictly voluntary, but we appreciate any assistance we receive for this important study. The responses will be used to help improve training and ensure that you receive the proper education in the future. Your identity will not be linked to your responses, so feel free to answer honestly and to add any additional comments you feel are necessary. Nonparticipation will not result in any adverse action. Please return this survey package no later than 15 Dec 94 to the address indicated on the survey package. If you require additional information or instruction to complete this survey, please contact Lt Diana Pry at AFIT/LA, DSN 785-7777, ext. 2190, or e-mail her at DPRY@AFIT.AF.MIL. Thank you in advance for your time on this very important effort.

ORIGINAL SIGNED

DONNA BACK, SES
Deputy Director, Comptroller

Attachments
1. Survey
2. AFIT Form 11E
3. Return Envelope

Financial Analyst Cost Management Survey

Instructions:

- Use a number 2 pencil
- Please read each question and darken the appropriate circle on the answer sheet provided
- Space for written comments has been provided at the end of the survey
- Your responses will remain anonymous. Please do not put your name on the answer sheet
- Please do not fold the answer sheets
- Thank you for your time
- If you have any questions please contact Lt Diana Pry at:

DSN: 785-7777 x2190
Commercial: (513) 255-7777 x2190
E-Mail: DPRY@AFIT.AF.MIL

SCN 94-88(a)

Section 1: Biographical Questions

1. Are you military or civilian?
    1. Military
    2. Civilian

2. Have you taken a financial management course (i.e., DSMC-System Acquisition Funds Management Course, Professional Military Comptroller Course, Comptroller Staff Officer Course, SYS 227-Financial Management in Weapon Systems Acquisition, QMT 175- Principles of Cost Analysis, or QMT 375-Quantitative Techniques for Cost and Price Analysis)?
    1. Yes
    2. No

3. Have you taken a contractor performance measurement course (i.e., DSMC-Contractor Performance Measurement Course, SYS 360-Evaluation of C/SCSC, SYS 361-Surveillance of C/SCSC, SYS 362-C/SCSC, SYS 363-Basic Analysis of Performance Measurement)?
    1. Yes
    2. No

4. Have you completed the AFIT Cost Analysis Master's Degree Program?
    1. Yes
    2. No

5. Have you completed an advanced management degree other than the AFIT Cost Analysis degree?
    1. Yes
    2. No

6. In what type of organization do you work?
    1. System Program Office
    2. Laboratory
    3. Headquarters
    4. Air Logistics Center
    5. Other (Please specify in the comment section).

7. How would you characterize your position?
    1. Cost analyst position.
    2. Budget analyst position.
    3. Other (Please specify in the comment section).

8. What is your role within your organization (Please choose the one that applies most)?

1. Matrixed to a project/program office
2. Collocated with a directorate/program office
3. Located with my functional organization supporting one project/program office
4. Provide overall support to more than one project/program office
5. Other (Please specify in the comment section).

9. At what level have you been APDP certified in Financial Management?

1. I
2. II
3. III

Please Turn to the Next Page

Section 2: Importance

In this section you will evaluate cost management competencies in terms of *importance*. Please note the response scale when answering the questions.

Importance

1	2	3	4	5	6
Not Important	Slightly Important	Important	Very Important	Extremely Important	Don't Know

How important is it for you to:

10. *Understand* the different types of appropriations (3080, 3400,3600, etc.) and the years they are available (including active, expired, and canceled years)
11. *Understand* the obligation rates set by the Air Force and the implications if these rates are not met
12. *Understand* current economic conditions and their impact on defense contractors
13. *Be able to* evaluate contractor financial health and viability using financial statements
14. *Understand* the results of financial statement analysis conducted to evaluate contractor financial health
15. *Be able to* apply time value of money techniques such as return on investment (ROI), net present value (NPV), internal rate of return (IRR), and Discounted Cash Flow (DCF)
16. *Understand* the impact of the time value of money on financing and budgeting
17. *Understand* how contractors secure funds to support ongoing projects, plant improvements, and new product development
18. *Be able to* develop a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)
19. *Understand* cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)
20. *Be able to* use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates
21. *Understand* the implications of uncertainty associated with cost estimates
22. *Be able to* use software tools to support cost estimation, cost analysis, and presentation
23. *Understand* the products of cost management software tools
24. *Understand* how contractors apply management reserve to respond to contingencies over the duration of a contract
25. *Be able to* apply inflation factors to program costs and funding

Importance

1	2	3	4	5	6
Not Important	Slightly Important	Important	Very Important	Extremely Important	Don't Know

How important is it for you to:

26. *Understand* the impact of inflation on program costs and funding
27. *Understand* the impact of production rate and quantity decisions on program cost
28. *Understand* the impact of budget cuts on unit marginal cost
29. *Understand* cost elements such as direct labor, direct materials, general & administrative, profit, and overhead
30. *Understand* ways to characterize costs such as fixed/variable and recurring/non-recurring
31. *Be able to* do break-even analysis using the concepts of fixed and variable costs
32. *Understand* the cost concepts of reasonableness, allocability, and allowability
33. *Be able to* apply learning curve techniques to analyze production costs
34. *Understand* the impact of learning curves on production costs
35. *Understand* the impact of the time value of money on financing and budgeting
36. *Be able to* develop a Work Breakdown Structure (WBS) that describes the entire work effort
37. *Understand* the uses of a WBS for cost management
38. *Understand* the role the organization plays in the Planning, Programming, and Budgeting System (PPBS)
39. *Understand* the congressional budgeting and appropriations processes
40. *Understand* the flow of funds through the expenditure categories of commitments, obligations, and expenditures
41. *Be able to* distribute the cost of work packages across the time horizon to develop a performance measurement baseline (PMB)
42. *Understand* the composition of a PMB
43. *Be able to* evaluate contractor cost accounting and control systems
44. *Understand* contractor cost accounting and control systems
45. *Be able to* select the appropriate contract type for a project
46. *Understand* the cost implications of alternative contract types and pricing mechanisms
47. *Understand* the impact of the political environment on acquisition management
48. *Be able to* generate congressionally required reports such as the Selected Acquisition Report (SAR)
49. *Understand* congressional reporting requirements

Importance

1	2	3	4	5	6
Not Important	Slightly Important	Important	Very Important	Extremely Important	Don't Know

How important is it for you to:

50. *Understand* the legal and regulatory requirements for cost and schedule control systems such as C/SCSC
51. *Understand* the impact of changes in scope on the cost of defense contracts
52. *Be able to* estimate earned value using methods such as weighted milestones and percent complete
53. *Understand* the concept of earned value and methods for calculating it
54. *Be able to* develop an estimate at completion (EAC) based on the data presented in contractor performance reports
55. *Understand* the use of estimates at completion (EAC) in cost management
56. *Be able to* analyze contractor reports such as the CPR and CSSR
57. *Understand* contractor cost reports such as the Cost Performance Report (CPR) and Cost / Schedule Status Report (CSSR)
58. 58. *Be able to* evaluate contractor-recommended corrective actions and select an appropriate course of action
59. *Be able to* develop corrective actions to counter unfavorable program variances

Section 3: Frequency

In this section you will evaluate cost management competencies in terms of *frequency of use*. Please note the new response scale.

Frequency

1	2	3	4	5	6
Annually or less	Quarterly	Monthly	Weekly	Daily	Don't Know

How frequently are you called upon to:

60. *Apply* time value of money techniques such as return on investment (ROI), net present value (NPV), internal rate of return (IRR), and Declining Cash Flow (DCF)
61. *Understand* the impact of the time value of money on financing and budgeting
62. *Understand* how contractors secure funds to support ongoing projects, plant improvements, and new product development
63. *Develop* a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)
64. *Understand* cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)

Comments

- Do you feel that any significant cost management competencies were omitted?

- What single activity related to cost management is the most important to you and what activity is most frequently used?

- Are there any cost management competencies that you feel more training is needed?

- Any other comments?

Please return this sheet with your answer sheet.

Financial Analyst Cost Management Survey

Instructions:

- Use a number 2 pencil
- Please read each question and darken the appropriate circle on the answer sheet provided
- Space for written comments has been provided at the end of the survey
- Your responses will remain anonymous. Please do not put your name on the answer sheet
- Thank you for your time
- If you have any questions please contact Lt Diana Pry at:

DSN: 785-7777 x2190
Commercial: (513) 255-7777 x2190
E-Mail: DPRY@AFIT.AF.MIL

SCN 94-88(b)

Section 1: Biographical Questions

1. Are you military or civilian?
    1. Military
    2. Civilian

2. Have you taken a financial management course (i.e., DSMC-System Acquisition Funds Management Course, Professional Military Comptroller Course, Comptroller Staff Officer Course, SYS 227-Financial Management in Weapon Systems Acquisition, QMT 175- Principles of Cost Analysis, or QMT 375-Quantitative Techniques for Cost and Price Analysis)?
    1. Yes
    2. No

3. Have you taken a contractor performance measurement course (i.e., DSMC-Contractor Performance Measurement Course, SYS 360-Evaluation of C/SCSC, SYS 361-Surveillance of C/SCSC, SYS 362-C/SCSC, SYS 363-Basic Analysis of Performance Measurement)?
    1. Yes
    2. No

4. Have you completed the AFIT Cost Analysis Master's Degree Program?
    1. Yes
    2. No

5. Have you completed an advanced management degree other than the AFIT Cost Analysis degree?
    1. Yes
    2. No

6. In what type of organization do you work?
    1. System Program Office
    2. Laboratory
    3. Headquarters
    4. Air Logistics Center
    5. Other (Please specify in the comment section).

7. How would you characterize your position?
    1. Cost analyst position.
    2. Budget analyst position.
    3. Other (Please specify in the comment section).

8. What is your role within your organization (Please choose the one that applies most)?

1. Matrixed to a project/program office
2. Collocated with a directorate/program office
3. Located with my functional organization supporting one project/program office
4. Provide overall support to more than one project/program office
5. Other (Please specify in the comment section).

9. At what level have you been APDP certified in Financial Management?

1. I
2. II
3. III

Please Turn to the Next Page

Section 2: Frequency

In this section you will evaluate cost management competencies in terms of *frequency of use*. Please note the response scale when answering the questions.

Frequency

1	2	3	4	5	6
Annually or less	Quarterly	Monthly	Weekly	Daily	Don't Know

How frequently are you called upon to:

10. *Understand* the different types of appropriations (3080, 3400,3600, etc.) and the years they are available (including active, expired, and canceled years)
11. *Understand* the obligation rates set by the Air Force and the implications if these rates are not met
12. *Understand* current economic conditions and their impact on defense contractors
13. *Be able to* evaluate contractor financial health and viability using financial statements
14. *Understand* the results of financial statement analysis conducted to evaluate contractor financial health
15. *Be able to* apply time value of money techniques such as return on investment (ROI), net present value (NPV), internal rate of return (IRR), and Discounted Cash Flow (DCF)
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17. *Understand* how contractors secure funds to support ongoing projects, plant improvements, and new product development
18. *Be able to* develop a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)
19. *Understand* cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)
20. *Be able to* use statistical analysis methods such as range analysis and confidence intervals to characterize the uncertainty associated with cost estimates
21. *Understand* the implications of uncertainty associated with cost estimates
22. *Be able to* use software tools to support cost estimation, cost analysis, and presentation
23. *Understand* the products of cost management software tools
24. *Understand* how contractors apply management reserve to respond to contingencies over the duration of a contract

Frequency

1	2	3	4	5	6
Annually or less	Quarterly	Monthly	Weekly	Daily	Don't Know

How frequently are you called upon to:

25. *Be able to* apply inflation factors to program costs and funding
26. *Understand* the impact of inflation on program costs and funding
27. *Understand* the impact of production rate and quantity decisions on program cost
28. *Understand* the impact of budget cuts on unit marginal cost
29. *Understand* cost elements such as direct labor, direct materials, general & administrative, profit, and overhead
30. *Understand* ways to characterize costs such as fixed/variable and recurring/non-recurring
31. *Be able to* do break-even analysis using the concepts of fixed and variable costs
32. *Understand* the cost concepts of reasonableness, allocability, and allowability
33. *Be able to* apply learning curve techniques to analyze production costs
34. *Understand* the impact of learning curves on production costs
35. *Understand* the impact of the time value of money on financing and budgeting
36. *Be able to* develop a Work Breakdown Structure (WBS) that describes the entire work effort
37. *Understand* the uses of a WBS for cost management
38. *Understand* the role the organization plays in the Planning, Programming, and Budgeting System (PPBS)
39. *Understand* the congressional budgeting and appropriations processes
40. *Understand* the flow of funds through the expenditure categories of commitments, obligations, and expenditures
41. *Be able to* distribute the cost of work packages across the time horizon to develop a performance measurement baseline (PMB)
42. *Understand* the composition of a PMB
43. *Be able to* evaluate contractor cost accounting and control systems
44. *Understand* contractor cost accounting and control systems
45. *Be able to* select the appropriate contract type for a project
46. *Understand* the cost implications of alternative contract types and pricing mechanisms
47. *Understand* the impact of the political environment on acquisition management
48. *Be able to* generate congressionally required reports such as the Selected Acquisition Report (SAR)

Frequency

1	2	3	4	5	6
Annually or less	Quarterly	Monthly	Weekly	Daily	Don't Know

How frequently are you called upon to:

49. *Understand* congressional reporting requirements
50. *Understand* the legal and regulatory requirements for cost and schedule control systems such as C/SCSC
51. *Understand* the impact of changes in scope on the cost of defense contracts
52. *Be able to* estimate earned value using methods such as weighted milestones and percent complete
53. *Understand* the concept of earned value and methods for calculating it
54. *Be able to* develop an estimate at completion (EAC) based on the data presented in contractor performance reports
55. *Understand* the use of estimates at completion (EAC) in cost management
56. *Be able to* analyze contractor reports such as the CPR and CSSR
57. *Understand* contractor cost reports such as the Cost Performance Report (CPR) and Cost / Schedule Status Report (CSSR)
58. *Be able to* evaluate contractor-recommended corrective actions and select an appropriate course of action
59. *Be able to* develop corrective actions to counter unfavorable program variances

Section 3: Importance

In this section you will evaluate cost management competencies in terms of *importance*. Please note the new response scale.

Importance

1	2	3	4	5	6
Not Important	Slightly Important	Important	Very Important	Extremely Important	Don't Know

How important is it for you to:

60. *Apply* time value of money techniques such as return on investment (ROI), net present value (NPV), internal rate of return (IRR), and Declining Cash Flow (DCF)
61. *Understand* the impact of the time value of money on financing and budgeting
62. *Understand* how contractors secure funds to support ongoing projects, plant improvements, and new product development
63. *Develop* a cost estimate using appropriate methods (e.g., parametric, analogy, grass roots)
64. *Understand* cost estimates developed using appropriate methods (e.g., parametric, analogy, grass roots)

Comments

- Do you feel that any significant cost management competencies were omitted?

- What single activity related to cost management is the most important to you and what activity is most frequently used?

- Are there any cost management competencies that you feel more training is needed?

- Any other comments?

Please return this sheet with your answer sheet.

Appendix C: Functional Board Responsibilities

As the principal advisor to the OUSD(A&T) on business, cost estimating, and financial management career program matters, the Board shall provide functional advice and recommendations in support of the overall implementation of the Defense Acquisition Education and Training Program to the OUSD(A&T). It shall:

1. Determine the experience, education, and training requirements to carry out the DoD business, cost estimating, and financial management function effectively. (Reference DoD 5000.52-M)

2. Ensure that the business, cost estimating, and financial management career fields are effectively developed and implemented for the DoD acquisition workforce.

3. Review business, cost estimating, and financial management designated training courses' curricula periodically to ensure that the material is relevant, current, complete and accurate, and recommend curricula and /or prerequisite changes as needed.

4. Make recommendations on the establishment or disestablishment of mandatory business, cost estimating, and financial management courses and recommend appropriate course equivalences in support of the DoD Acquisition Education and Training Program.

5. Periodically review training requirements, resource allocations, course quotas, student attendance rates, priorities, funding and available reports to ensure they support the goal of attaining a fully qualified workforce within these disciplines.

6. Recommend means for enhancement of technical competence in the business, cost estimating, and financial management functional area to include cross training, internships, and career development rotational assignments between various DoD components as well as other Government agencies.

7. Establish and review periodically the DoD criteria for designating business, cost estimating, and financial management acquisition positions.

8. Monitor and evaluate the status of the business, cost estimating, and financial management functional area in the Acquisition Corps of the respective DoD Components.

Appendix D: Comparison of Competencies

Functional Board	SCEA	Baxter & Bolin
Interpret regs, policies, procedures		
Review proposed changes to the above		
Ensure cost analysis products comply with standards & req'ts	Methods & standards	
Prepare life cycle cost estimates that include all major components	Life Cycle Cost	Develop & understand cost estimates
Prepare baseline cost estimates		Develop & understand cost estimates
Prepare independent government cost estimates		Develop & understand cost estimates
Develop cost data to be used in estimates	Sampling Techniques	
Determine cost impacts of production schedules		
Determine cost impacts of deployment schedules		
Apply learning curve theory to develop cost estimates	Learning curves	Learning curve techniques to analyze production costs
Develop & apply Work Breakdown Structure (WBS)	Work Breakdown Structure (WBS)	Work Breakdown Structure (WBS)
Analyze & evaluate scheduling techniques in relationship to contract oriented baselines		
Evaluate contractor performance using CPR, CSSR and CFSR		Understand cost control systems
	Cost accounting systems & standards	Understand contractors cost accounting & control systems
Review performance measurement baseline to evaluate contractor performance		Develop & understand a performance measurement baseline
	Contract types	Understand contract types
		Cost implications of various contract types
Define data source		

Functional Board	SCEA	Baxter & Bolin
Determine contractual financial reporting requirements		
Review and validate contractor management control system for compliance with C/SCSC		Analyze contractor reports such as CPR & C/SCSC
Develop government estimates at completion from contractor performance measurement reports		Develop & understand estimates at completion
Analyze contractor's projected costs, rates, and pricing factors		Evaluate contractor financial health
Review significant direct and indirect cost elements	Direct/Indirect costs, G&A, overhead, profit	Cost elements such as direct/indirect costs, G&A, materials, overhead, profit
Analyze costs for allowability, allocability and reasonableness	Allowable costs	Reasonableness, allocability, & allowability
Review and evaluate cost estimates		
Evaluate contractors financial position and past performance		Evaluate contractor recommended actions
Perform overhead rate analysis	Overhead	
Perform production rate analysis	Production functions	Impact of production rate & quantity
Conduct force structure cost estimates		
Review technical and audit reports	Technical report writing	
Provide cost estimating assistance & support		
Forecast price trends		
Convert cost estimate from constant $s to current/then year $s	Present value/Time value of money/Discounted $s	Time value of money techniques & impact
Evaluate cost proposals for realism, risk, reasonableness, responsiveness		
Recommend agreement or disagreement with proposed cost		
Analyze and document variance or inconsistencies in cost estimates		Develop corrective actions to counter program variance
Develop cost benefit analysis	Cost-benefit analysis	
Identify, collect, analyze, and normalize data required for cost analyses	Scaling	

Functional Board	SCEA	Baxter & Bolin
Develop economic analysis	Internal/External economies	Economic conditions & the impact
Prepare risk analyses	Risk/Uncertainty	Uncertainty
Review and validate economic analysis	Economic life/Economic efficiency	Economic conditions & the impact on contractors
Develop and analyze acquisition reports	Technical report writing	
Develop inflation factors		Understand & apply inflation factors
Provide guidance on development and application of inflation factors		Understand & apply inflation factors
Prepare contractor cost proposal requirements for the RFP		
Develop cost estimates for POM		Develop cost estimates
Establish negotiation objectives		
Defend price positions used in negotiating cost elements	Public speaking	
Provide buying activities with information and rationale to use in negotiation to mitigate “pass through” costs		
Develop software applications for local data analysis and collection		Software tools to support cost estimating/analysis
Establish, maintain, or improve cost database		
Identify need for special price/cost analysis requirements & projects		
Recommend contractual/financial arrangements that provide incentives for efficient & economic contract performance		
Conduct cost research	Methods & standards	
Collect and analyze operating support data	Operating & support costs	
Present & defend cost estimates	Public speaking	
Develop cost models	Methods & standards	
Develop risk models	Risk/Uncertainty	Uncertainty
Prepare statistical/quantitative analyses	Various statistical theories/methods	Statistical techniques
Prepare parametric, analogous & engineering estimates	Parametric, analogy, grass-roots estimating	Parametric, analogy, grass-roots estimating

Functional Board	SCEA	Baxter & Bolin
Develop cost estimating relationships	Cost estimating relationships	
Evaluate off-the-shelf cost models		
Develop design to cost estimates and review performance as required		Develop cost estimates
		Appropriation Types
		Congressional budgeting, PPBS
	Unit costing	Unit costs
	Break-even analysis	Break-even analysis
	Fixed/variable costs; Recurring/ nonrecurring costs	Fixed/variable costs; Recurring/ nonrecurring costs

Appendix E: Combined Results Median Sums

Question #	Median Sum	Valuable		Question #	Median Sum	Valuable
10	9	X		35	5	
11	7	X		36	4	
12	5			37	6	X
13	4			38	7	X
14	4			39	7	X
15	4			40	8	X
16	5			41	4	
17	4			42	5	
18	6	X		43	4	
19	7	X		44	5	
20	5			45	4	
21	6	X		46	4	
22	7	X		47	5	
23	6	X		48	4	
24	5			49	5	
25	7	X		50	5	
26	7	X		51	7	X
27	7			52	5	
28	6	X		53	6	X
29	8	X		54	6	X
30	7	X		55	7	X
31	4			56	6	X
32	5			57	7	X
33	4			58	5	
34	6	X		59	5	

Appendix F: Don't Know Responses by Survey Type

Frequency Survey Don't Know Percentages

Question #	% Don't Know		Question #	% Don't Know		Question #	% Don't Know
10	1.8		28	9.4		46	14.4
11	6.1		29	4.3		47	8.7
12	5.4		30	4.0		48	17.7
13	13.4		31	13.0		49	15.2
14	13.7		32	13.0		50	14.8
15	13.0		33	13.7		51	10.1
16	10.5		34	9.7		52	17.3
17	16.2		35	10.8		53	18.1
18	14.1		36	11.6		54	15.2
19	11.9		37	9.4		55	14.1
20	17.0		38	3.6		56	15.2
21	8.7		39	3.2		57	14.1
22	12.3		40	4.0		58	18.8
23	13.4		41	18.1		59	17.7
24	14.4		42	17.0		60	11.6
25	6.5		43	15.5		61	8.3
26	4.3		44	14.1		62	10.5
27	9.7		45	17.0		63	8.7
						64	9.7

Importance Survey Don't Know Percentages

Question #	% Don't Know		Question #	% Don't Know		Question #	% Don't Know
10	1.2		28	3.6		46	5.2
11	2.4		29	0.8		47	5.6
12	3.6		30	1.6		48	6.8
13	3.2		31	4.4		49	6.0
14	2.8		32	8.0		50	3.6
15	2.8		33	4.4		51	3.6
16	3.6		34	4.0		52	6.4
17	4.8		35	4.0		53	6.8
18	3.2		36	4.0		54	6.0
19	2.8		37	3.2		55	5.6
20	3.2		38	2.0		56	5.6
21	2.4		39	2.4		57	4.8
22	3.2		40	1.6		58	5.6
23	3.2		41	7.6		59	6.0
24	4.0		42	6.0		60	15.5
25	2.0		43	4.0		61	12.4
26	2.4		44	3.2		62	17.1
27	2.8		45	5.2		63	13.1
						64	11.6

Appendix G: Influence of Situational Factors, Kruskal-Wallis Results

Military vs. Civilian

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	.7013	**.0024**		35	.5253	.5140
11	.2769	.1511		36	.4870	.8791
12	.8572	.1027		37	.3558	.6895
13	.3902	.4868		38	.2549	.6545
14	.4485	**.0192**		39	.5280	.1539
15	.3072	**.0098**		40	.1790	.0961
16	.3430	.1857		41	.2287	**.0067**
17	.1162	.4688		42	.3746	**.0044**
18	.2251	.5716		43	.5812	.1416
19	.3581	.6699		44	.7798	.1314
20	.2191	**.0011**		45	.2859	.0605
21	.9968	.1088		46	.0809	.6783
22	.2702	.7347		47	.8600	.2814
23	.5089	.6001		48	.3721	**.0244**
24	.2737	.2667		49	.2892	.1802
25	.6892	**.0412**		50	.5992	.1787
26	.8045	.3135		51	.0586	.1140
27	.7436	.3647		52	.3721	**.0005**
28	.1224	.1193		53	.1900	.1097
29	.4457	**.0068**		54	.1141	**.0004**
30	.4636	.1184		55	**.0455**	.1373
31	.8902	**.0000**		56	.1179	.1161
32	.3577	**.0069**		57	.1039	.1390
33	.5646	**.0084**		58	**.0318**	**.0015**
34	.6635	**.0083**		59	.0864	**.0110**

Type of Financial Analyst

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	.2272	**.0118**		35	**.0347**	.2151
11	.1232	**.0255**		36	**.0097**	**.0000**
12	**.0054**	.0722		37	**.0004**	.1196
13	.4227	.0706		38	.1093	**.0273**
14	.4997	.2838		39	.1549	**.0035**
15	.1020	.0587		40	.0598	**.0005**
16	**.0109**	.4259		41	.1315	.9850
17	.4222	.1049		42	.2419	.0956
18	**.0000**	**.0000**		43	**.0011**	.3161
19	**.0000**	**.0005**		44	**.0110**	.9995
20	**.0000**	**.0005**		45	.1090	.2315
21	**.0001**	**.0034**		46	.2792	.7991
22	**.0000**	**.0000**		47	.5428	.4617
23	**.0000**	**.0024**		48	.1497	.1020
24	**.0398**	.1516		49	.8017	**.0177**
25	**.0001**	**.0012**		50	.1222	.3670
26	**.0001**	**.0003**		51	.0629	.3180
27	**.0000**	.7263		52	.1092	.5221
28	.0757	.2512		53	.0526	.0882
29	**.0007**	**.0002**		54	.0713	**.0036**
30	**.0000**	**.0001**		55	**.0177**	.1811
31	.0598	.0653		56	**.0304**	.0707
32	.1256	.2656		57	**.0346**	.1543
33	**.0004**	**.0000**		58	.1826	.0758
34	**.0000**	**.0024**		59	.5970	.0613

Type of Organization

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	.8342	**.0013**		35	.4746	.9596
11	.7976	.0856		36	**.0290**	.6540
12	.4870	.8707		37	**.0165**	**.0005**
13	**.0054**	.0678		38	.5897	.1358
14	**.0191**	.1356		39	.2705	**.0003**
15	.1780	.0895		40	.8883	**.0000**
16	.3078	.8989		41	.1820	.1241
17	.0665	**.0226**		42	.0660	**.0000**
18	.0513	.2745		43	**.0012**	.0956
19	**.0253**	**.0019**		44	**.0275**	**.0000**
20	.2313	.2268		45	.3654	.0758
21	.0909	**.0184**		46	.2036	.0544
22	.1706	.8474		47	.8520	**.0365**
23	.3131	**.0092**		48	**.0002**	.0856
24	**.0010**	**.0000**		49	**.0166**	**.0000**
25	.0739	**.0000**		50	**.0408**	**.0000**
26	.1639	**.0093**		51	.0863	**.0009**
27	.0642	**.0012**		52	**.0028**	**.0016**
28	**.0107**	**.0006**		53	**.0013**	**.0000**
29	**.0004**	**.0103**		54	**.0013**	**.0000**
30	.0649	.0574		55	**.0002**	**.0000**
31	.7085	**.0000**		56	**.0001**	**.0000**
32	.7749	.1589		57	**.0002**	**.0000**
33	**.0475**	**.0292**		58	.0586	**.0000**
34	**.0407**	.0574		59	.1489	**.0000**

Organizational Arrangement

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	.8315	.2356		35	**.0157**	.3258
11	.0516	.2014		36	.1123	.6281
12	.0614	.8705		37	.1171	**.0392**
13	.0555	.1356		38	.1806	.2039
14	.1339	.1156		39	.2131	**.0373**
15	.0567	**.0001**		40	.0575	.0639
16	**.0041**	.2094		41	**.0388**	.6109
17	**.0353**	.9228		42	**.0009**	**.0172**
18	.1068	.7261		43	**.0132**	.1359
19	.5024	.4982		44	**.0228**	**.0188**
20	.6985	.5000		45	.4873	.1862
21	.1058	.2544		46	.1745	.3641
22	.5490	.7338		47	.2867	.8479
23	.5641	.9001		48	.1699	.0658
24	**.0225**	**.0366**		49	.3012	.1276
25	**.0451**	.2328		50	**.0127**	**.0488**
26	.1254	.2716		51	**.0004**	.1161
27	.1165	.1087		52	**.0137**	.2295
28	.1243	**.0002**		53	**.0030**	**.0044**
29	**.0003**	.3856		54	**.0482**	**.0014**
30	.1861	.4949		55	**.0010**	**.0003**
31	.8750	.0758		56	**.0004**	**.0000**
32	.5835	.2506		57	**.0022**	**.0000**
33	.2395	.2935		58	**.0080**	**.0005**
34	.1707	.6169		59	**.0106**	**.0251**

Appendix H: Influence of Education, Kruskal-Wallis Results

Financial Management Courses

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	**.0000**	**.0139**		35	.4003	.8978
11	**.0001**	.0827		36	**.0125**	.4474
12	**.0001**	.1746		37	**.0003**	**.0119**
13	**.0014**	.0880		38	**.0000**	**.0220**
14	**.0108**	**.0001**		39	**.0000**	**.0477**
15	.2435	.1007		40	**.0016**	.5238
16	**.0062**	.6248		41	**.0007**	.9581
17	**.0029**	.5239		42	**.0026**	.2776
18	**.0142**	.0578		43	**.0034**	.0568
19	**.0000**	**.0049**		44	**.0000**	.1308
20	.1256	.1833		45	**.0427**	.6610
21	**.0274**	**.0346**		46	**.0000**	.1483
22	.6978	**.0432**		47	**.0004**	**.0186**
23	.1464	.2888		48	**.0067**	.6425
24	**.0001**	.3092		49	**.0000**	.1170
25	.0733	**.0005**		50	**.0003**	**.0073**
26	.0818	**.0026**		51	**.0001**	**.0272**
27	.2697	.2212		52	**.0055**	.8445
28	**.0001**	**.0000**		53	**.0000**	.1272
29	.5277	.0615		54	**.0001**	.0573
30	.0567	**.0054**		55	**.0000**	.0667
31	.3670	.2320		56	**.0000**	.0714
32	.0738	.9437		57	**.0000**	**.0292**
33	**.0257**	**.0254**		58	**.0169**	.2858
34	**.0030**	.2249		59	**.0389**	.7177

Contractor Performance Measurement Courses

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	**.0000**	**.0102**		35	**.0102**	.7049
11	.3720	.2868		36	**.0000**	**.0456**
12	**.0000**	.3095		37	**.0000**	**.0023**
13	**.0001**	.5891		38	**.0001**	.7477
14	**.0000**	.5460		39	**.0004**	.5601
15	.1186	.9753		40	**.0223**	.8062
16	.0621	.7084		41	**.0000**	.0752
17	**.0024**	.5532		42	**.0000**	**.0201**
18	**.0000**	**.0021**		43	**.0000**	**.0107**
19	**.0000**	**.0001**		44	**.0000**	**.0002**
20	**.0001**	.3331		45	**.0004**	.1407
21	**.0000**	**.0002**		46	**.0000**	.6400
22	**.0004**	.3234		47	**.0003**	**.0040**
23	**.0002**	.0844		48	**.0002**	**.0202**
24	**.0000**	.1626		49	**.0001**	.1620
25	**.0000**	**.0001**		50	**.0000**	.0861
26	**.0000**	**.0056**		51	**.0000**	**.0034**
27	**.0000**	.1942		52	**.0000**	.1813
28	**.0000**	.3807		53	**.0000**	**.0108**
29	**.0000**	**.0080**		54	**.0000**	**.0000**
30	**.0000**	**.0188**		55	**.0000**	**.0010**
31	.0542	.1155		56	**.0000**	**.0218**
32	**.0000**	.6987		57	**.0000**	**.0032**
33	**.0001**	.0573		58	**.0000**	**.0314**
34	**.0000**	.4450		59	**.0000**	.5531

AFIT Cost Analysis Master's Degree

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	.2597	.1994		35	.5154	**.0091**
11	.8683	.7705		36	.3637	**.0105**
12	.4205	.4656		37	.1269	**.0002**
13	.0555	.3239		38	.3089	**.0044**
14	**.0335**	**.0072**		39	.5570	.0500
15	.1426	**.0000**		40	.2389	.1277
16	.1188	**.0168**		41	.2213	**.0903**
17	**.0292**	.7247		42	.5155	.3673
18	.0548	**.0002**		43	.7908	.8080
19	**.0126**	**.0006**		44	.7883	.1711
20	.3500	**.0023**		45	.1306	.4060
21	**.0295**	**.0040**		46	**.0012**	**.0000**
22	.0686	**.0000**		47	.3732	**.0006**
23	.4169	**.0023**		48	.7015	.2768
24	.0529	.4964		49	.1957	**.0046**
25	.1271	**.0000**		50	.3586	.9472
26	.2073	**.0001**		51	.7225	**.0349**
27	.8403	.0988		52	.3156	.1878
28	.4902	.6612		53	**.0218**	**.0776**
29	.6148	**.0175**		54	.1264	.7483
30	.7013	**.0011**		55	.0737	.1393
31	.1842	.4631		56	.2560	.3903
32	.0819	.5264		57	.3221	**.0153**
33	.4271	**.0000**		58	**.0274**	**.0417**
34	.1804	**.0000**		59	**.0498**	.9097

Other Graduate Management Degree

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	**.0152**	.1660		35	.3594	.0652
11	.2270	.3981		36	**.0010**	.4265
12	**.0041**	.3062		37	**.0014**	.3520
13	.1215	.9240		38	**.0323**	**.0328**
14	**.0111**	.9965		39	.0755	.2262
15	**.0335**	.6998		40	.6618	.9141
16	.2285	.4731		41	.0609	.3926
17	**.0050**	.7424		42	**.0222**	.3822
18	**.0003**	.4066		43	**.0379**	.2161
19	**.0000**	.2631		44	**.0276**	**.0029**
20	**.0045**	.3467		45	**.0042**	**.0000**
21	**.0039**	.4343		46	**.0001**	.1129
22	.4214	.2674		47	.0696	**.0457**
23	**.0218**	.0954		48	**.0179**	.8581
24	**.0010**	.7342		49	**.0441**	.1008
25	.2046	**.0174**		50	**.0050**	**.0195**
26	**.0234**	.0791		51	**.0029**	.1153
27	.1306	.6955		52	**.0144**	.9600
28	**.0019**	.2415		53	**.0000**	**.0099**
29	**.0030**	**.0337**		54	**.0022**	.6841
30	**.0192**	**.0223**		55	**.0000**	.3005
31	.4704	**.0003**		56	**.0032**	.6074
32	**.0176**	.4349		57	**.0001**	.2014
33	**.0070**	.5214		58	**.0084**	**.0268**
34	**.0066**	.9238		59	**.0005**	**.0011**

Level of APDP Certification

Question #	Importance P-Value	Frequency P-Value		Question #	Importance P-Value	Frequency P-Value
10	**.0205**	.5153		35	.5354	**.0159**
11	.0598	.6083		36	.4794	.7767
12	.2244	.8207		37	.0752	.3349
13	.0939	.8746		38	.0590	.4360
14	.3678	.9329		39	**.0030**	.3535
15	.2017	**.0158**		40	**.0187**	.4199
16	.1344	.7206		41	.6336	.8049
17	.5035	.2485		42	.6936	.4569
18	.6813	.2924		43	.3401	.3718
19	.1700	.3790		44	.0838	.2950
20	.2045	.1571		45	.0740	.2441
21	.2434	.7789		46	**.0214**	.1508
22	.7175	.4095		47	**.0060**	.2772
23	.2031	.3104		48	.4116	.1310
24	.0807	.0584		49	.1874	.5719
25	.9201	.7371		50	.0504	.1762
26	.8569	.8702		51	.2020	.3268
27	.7500	.5484		52	.1849	.7755
28	.2911	**.0164**		53	**.0493**	**.0078**
29	**.0318**	.1022		54	.0792	.0674
30	3496	.5358		55	.0955	.0936
31	.3794	**.0000**		56	.3908	.2589
32	.1782	.2295		57	.1084	.3386
33	.2276	.5104		58	.6715	.0777
34	.3203	.8887		59	**.0389**	.0536

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Vita

Captain Diana Pry was born on 26 July 1969 in Xenia, Ohio. She graduated from Xenia High School in 1987. In 1991, Captain Pry received a Bachelor of Science in Mathematics from Wright State University and was commissioned a 2Lt, USAF through the Air Force ROTC program. She was subsequently assigned to Kirtland AFB, New Mexico as a budget analyst at Phillips Laboratory. While at Kirtland Captain Pry received a Masters of Business Administration (MBA) in Finance from Webster University. In May of 1994 she entered the Graduate School of Logistics and Acquisition Management at the Air Force Institute of Technology in the Cost Analysis program. She is married to Raymond Pry, Captain, USAF and they are expecting their first child in October.

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